Traffic Education for Montana Schools

A Resource Curriculum

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Traffic Education

for

Montana Schools

A Resource Curriculum

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Foreword

This publication, *Traffic Education for Montana Schools, A Resource Curriculum,* is an update and revision of the office's 1973 publication, *Traffic Education Instructional Programming for Montana Schools.* Like the previous publication, this resource curriculum is intended to serve as a guideline for teachers and administrators in the development and/or revision of their local high school's driver and traffic safety education program.

The traffic education course available today in virtually every high school in Montana is an outgrowth of the **driver education course** first taught over 18 years ago. Although its content has been modified over the years to reflect the ever-changing highway traffic environment, its basic goal of encouraging Montana's youth to make wise decisions and drive responsibly has remained unchanged.

Excellence throughout the educational system of Montana is the number one goal of this office. This publication will allow you to compare your present traffic education curriculum with the latest thinking regarding student objectives, course content, student learning activities, and instructional materials. It is not **the answer**; rather, it is a **suggested guideline**, a way for you to possibly strengthen and update the program now being taught.

I hope you find the information provides answers to questions you may have about instructional programming in traffic education. However, should you need additional assistance or wish to make suggestions or comments, you may contact my Traffic Education Specialist via mail or call toll free 1-800-332-3402. Best wishes for a program of excellence.

Sincerely,

Ed Argenbright
State Superintendent

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Why Driver and Traffic Safety Education?

The growth and development of a nation depends largely upon the capability of its transportation system to move persons and goods to desired locations safely, rapidly and efficiently. Highway transportation, a sub-system of the complete transportation system, is a huge, loosely coordinated complex consisting of more than 150 million vehicles and operators, traveling in excess of 1.5 billion miles a year on 3.9 million miles of roadway. It is becoming increasingly important that the highway transportation sub-system (hereafter referred to as the system) be coordinated with air, water and rail transportation sub-systems.

The development and management of highway transportation involves millions of people in a gigantic task of business, manufacturing and public administration. This task entails producing vehicles; building roads and parking facilities; providing supplies and services which vehicle owners require; developing devices; informing, educating, and controlling drivers; and many other activities. Primary management forces are engineering (highway, traffic and vehicle), motor vehicle administration, police traffic supervision, traffic courts, medical care and transportation of the injured, and education. Since the Department of Transportation was established, the federal government has played a major role in setting management standards and providing financial support to achieve greater uniformity and effectiveness.

We play varied and active roles in the highway transportation system. Millions of people are engaged in occupations directly related to developing and managing highway transportation. Nearly two-thirds of the entire population are involved as eligible voters and taxpayers, influential in determining public policy and in financing the system. Of these, more than 100 million—nearly half of the population—are licensed operators, forming a major component in the man-machine-roadway system as they interact with each other and as they relate to management functions. In short, the highway transportation system touches everyone.

People need formal preparation to perform the varied traffic-related tasks, of which driving is the most prominent. Operating a motor vehicle is a complex and important task that the average driver performs 300 hours per year, which amounts to 375 weeks of driving in a lifetime. It can be argued that driving is the most important skill in contemporary society, insofar as the threat to human life is concerned. In any case, it is too important to learn by chance or in a haphazard way. Elementary and secondary schools can and should contribute their resources to introducing young people to the highway transportation system and to preparing them for increasingly active roles, not only as drivers, but also as informed and active supporters of sound traffic safety programs.

Education for traffic safety should have its foundation in the elementary schools. While children of elementary school age do not drive motor vehicles, they are active participants in the system as pedestrians, passengers and operators of bicycles. There is some indication that potential problem drivers can be identified among elementary school children, and this suggests that remedial efforts can be planned to modify the characteristics that make these children susceptible to accidents later. Apart from this point, all elementary school youth will profit by well conceived instruction that helps them acquire the concepts, skills and values needed as a sound basis for a lifetime of safe and efficient use of highway transportation facilities.

Secondary schools are uniquely qualified to prepare young people for entrance into the traffic system as operators and as responsible participants in programs which affect system performance. At this level of formal education, young people reach legal driving age in an environment that includes resources for learning under professional teachers. Student interest in learning to drive can be exploited not only for creating good drivers but also to put meaning into many concepts and values considered as general education. The primary aims of secondary school driver and traffic safety education are to:

1. prepare students with at least minimum performance capabilities for entry into the highway traffic system as vehicle operators;
2. equip students with knowledge and thought processes that will enable them to make wise decisions in situations that could lead to impaired driving performance (alcohol, drugs, fatigue, emotions and vehicle maintenance); and
3. help students acquire the insights and motivations needed to become fully functioning operators and responsible members of the system.

The third objective implies continuing development of traffic-related competencies throughout a driver's career, made possible by learning experiences in driver and traffic safety education. Driver education experiences should help students acquire a clear and full picture of driving performance variables as a profile for assessing and improving their own and system performance.

Curriculum construction in driver and traffic safety education should be tied in with overall curriculum planning. Many of the crucial issues in traffic safety are not isolated issues but instead are related to the broad areas of human behavior. For example, the drinking and driving problem is simply part of the alcohol problem in general. The same can be said about drug use, emotions, the aging process, law and order, and other social problems. These concerns are identified in the traffic environment by poor performance and accidents. This reality suggests that the driver and traffic safety education teacher should work with other teachers, and with outside agencies, to develp and implement a coordinated instructional plan that integrates and reinforces traffic-related concepts and values throughout the curriculum.

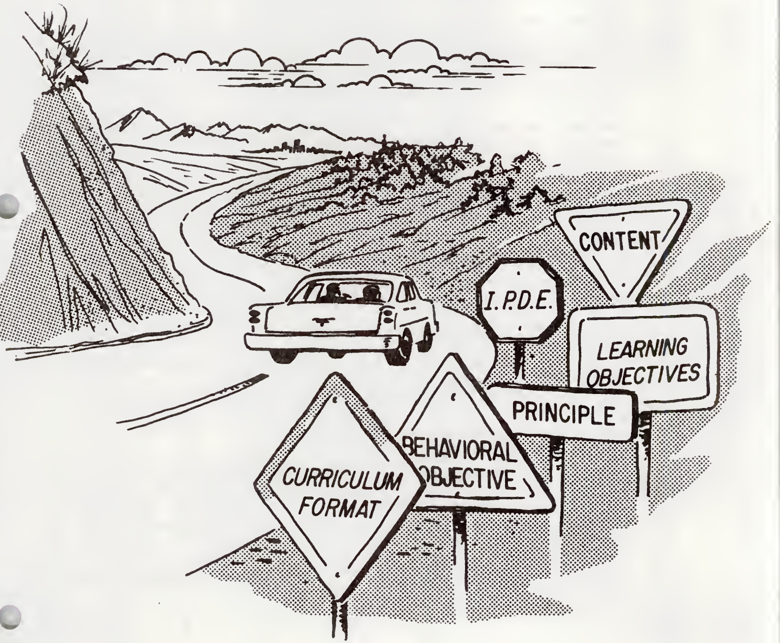
Teaching related to the highway transportation system can best be carried forward in a separate course, for it concerns learning that embraces the cognitive (knowledge and intellectual skills), affective (attitudes, values and emotional sets) and psychomotor (neuromuscular coordination). Conceivably, many traffic-related concepts could be, and in some cases are, integrated in physics (physical laws), health education (alcohol and drug use), vocational education (vehicle maintenance), business education (vehicle insurance), social studies (social and economic effects), and other subjects. This practice should be encouraged. However, not every student takes all of these courses, so they would be only partly "educated." In the absence of a separate course, even perfect integration would fail to cover a substantial body of content which deals with the act of driving (e.g., basic control tasks, interacting with other highway users, handling complex and critical situations). To ask other subject are instructors to assume this burden would distract them from their primary objectives, and teacher competency would be in question.

Multiple forces help to shape the behavior of highway users, even before individuals reach driving age. Behavior when operating a motor vehicle mirrors the kind of person we represent. Granted, the frustrations and anonymity of the highway traffic environment can bring out the worst in us. Nevertheless, our overt acts reflect our personality and temperament. This reality helps us to see that any experience which helps to mold our beliefs and attitudes—particularly those related to self-concept and concepts about other people—indirectly influences our behavior in relating to the highway traffic system.

Although driver and traffic safety education is only one force that influences operator behavior, it can have a most powerful influence. The course cannot be expected to change the student's "style of life," but it can change the "style of driving." Furthermore, a quality program can influence the other forces that determine operator behavior. Students in today's driver education classrooms will be the parents, traffic police, judges, engineers, motor vehicle administrators and private citizens of tomorrow. But neither students nor teachers need to wait for the long-range payoffs. They can become involved in immediate system improvement measures.

In summary: Secondary school driver and traffic safety education, as one of the direct forces influencing operator behavior, can also exert beneficial influence, both immediate and long-range, on the highway transportation system. The ultimate goal of driver and traffic safety education is to improve the quality of human decisions and performance tasks related to the system in a manner that encourages continuing improvement. To the degree that we are successful in attaining this goal, we increase the probability that operators will be able to drive from origin to destination safely, expeditiously, conveniently and economically, thereby serving both individual and system purposes.

Introduction



Introduction

One of the most common, and yet most sophisticated, systems of our time is our transportation system. The growth and development of our nation depends upon the capability of this system to move persons and goods to desired locations safely, rapidly and efficiently. The major components of this system are: the individuals who use the system, the vehicles which move people, and the ever-changing environments in which individuals and vehicles operate.

Operating a motor vehicle is a complex and important task. Formal preparation to perform these varied traffic-related tasks of driving is necessary. Driving may be the most important skill in contemporary society; it is too important to learn by chance or in a haphazard way. Traffic behavior is a complex task which demands a constant process of observing, evaluating and decision making. Driving is a physical, mental and social task that must be learned.

Traffic education programs are an important part of the curriculum. Properly taught and applied, these programs promote human conservation and provide a medium for development of self-control, decision making, and personal and social responsibility. The overall objectives of traffic education in Montana schools are as follows:

1. The student can demonstrate proficiency in driving tasks under varying road and traffic conditions.
2. The student can select and apply, in various traffic situations, learned information concerning traffic laws and regulations, vehicle dynamics and highway environmental factors.
3. The student can demonstrate decision-making capabilities required for competent operation in a variety of highway environments under existing conditions.
4. The student can define the variety of psychological, social and physical factors which influence driving and develop personal habits to minimize ineffective traits and habits.
5. The student will analyze and select programs and systems of traffic management that will provide effective benefits to the user of the highways.

Specifically, each student completing a course in traffic education will be able to:

1. describe the personal responsibility of every driver to the proper functioning of the highway transportation system;
2. evaluate the human functions of "identify, predict, decide, and execute" and accurately apply them to all aspects of driving;
3. locate and identify the function of controls, gauges, and safety features of the vehicle;
4. execute pre-start and starting procedures;
5. enter the traffic flow from a parked position;
6. make smooth and effective stops from various predetermined speeds;
7. negotiate various left and right turns and demonstrate correct pre-turn, turn and post-turn procedures at selected controlled and uncontrolled intersections;
8. demonstrate visual search actions, control of steering, speed, braking and avoidance of conflicts while backing through a series of driving maneuvers;
9. secure and leave a parked vehicle safely;
10. determine the effect of various shapes and conditions of road surfaces upon vehicles;

11. determine the effect of various degrees of braking, acceleration and steering upon different vehicles;
12. identify and interpret traffic signs, controls and pavement markings;
13. be aware of the importance of visual perception and visual limitations as related to the driving task, being provided the means by which to measure his/her own visual abilities;
14. identify driving distractions and determine methods to overcome them;
15. identify distractions inside and outside the vehicle and explain how to compensate for them;
16. list the situations involved in maintaining correct lane positioning and placement;
17. identify the factors involved in following and determine techniques to minimize possible conflicts;
18. identify the necessity of a constant visual search, proper lane placement, proper signaling and proper speeds when being followed;
19. appraise the need for proper lane changes and identify the problems and techniques involved;
20. describe the complete passing maneuver and list the hazards that are associated with such a maneuver;
21. identify possible conflicts in being passed and develop techniques to minimize such dangers;
22. analyze and determine the procedures for the various forms of parking;
23. identify and describe the proper procedures for executing various turnabouts;
24. execute proper methods for passing when provided a selected passing situation;
25. demonstrate lane placement, communication and speed control to drivers following;
26. identify potentially dangerous meeting situations, predict possible traffic development, decide on the best course of action, and properly regulate the speed and placement of the vehicle while negotiating roadways with oncoming traffic;
27. demonstrate lane placement, speed control and directional control to other drivers who are passing;
28. perform the parallel parking maneuver in an appropriate traffic environment;
29. perform the angle parking maneuver in an appropriate traffic environment;
30. execute a two-point turn in the traffic environment;
31. complete a three-point (Y) turn in the traffic environment;
32. perform a U-turn in the traffic environment;
33. demonstrate the proper actions at various types of intersections;
34. recognize types of intersections, conflicts and hazards related to intersections;
35. operate a vehicle in a safe, conscientious manner, demonstrating proper driving techniques while driving in a residential area;
36. operate a vehicle in a safe, conscientious manner, demonstrating proper driving techniques while driving in city traffic environments;
37. operate a vehicle on a four-lane, controlled access roadway in a safe, conscientious manner, demonstrating proper driving techniques;
38. operate a vehicle in a safe and conscientious manner, demonstrating proper driving techniques while driving in a rural traffic environment;
39. evaluate the correct response to hazardous traffic conflicts;
40 identify preventive measures to minimize traction loss of vehicle;
41. define procedures to be followed when confronted with critical driving situations due to vehicle malfunction;
42. demonstrate proper reaction to various vehicle malfunctions;

43. demonstrate proper reaction to a real or simulated traction loss and other critical driving situations;
44. describe the problems associated with adverse weather driving including ice, snow, rain, fog and wind;
45. identify the problems of driving associated with pedestrians and animals;
46. identify urban traffic situations and develop methods to reduce possible conflicts;
47. identify driving situations in residential driving and determine solutions to reduce conflicts;
48. identify the hazards encountered on rural highways and develop procedures to reduce such conflicts;
49. identify various critical segments of freeway driving and develop methods to minimize such problems;
50. determine the various factors involved in minimizing impact forces;
51. define and evaluate the components of vehicle inspection and vehicle maintenance and their impact on crash reduction;
52. identify types of collisions, contributing factors, and ways to minimize them;
53. identify the various features of a vehicle which will affect the safety of the driver;
54. identify the procedures to follow at the scene of a collision;
55. Identify and evaluate the various aspects of financial responsibility;
56. list the physical, psychological, sociological, statistical and legal aspects of the use of alcoholic beverages and link them to the driving task in terms of problems, dangers and solutions;
57. classify various types of drugs, state the effect they have on the body, explain the dangers of driving while under the influence;
58. know how basic emotional states affect driving and how to overcome or compensate for these;
59. explain how physical fitness relates to driving and how best to compensate for or overcome physical problems;
60. evaluate how vehicle style, operation and model directly influence the salability of the vehicle;
61. Identify methods to promote energy conservation and explain how they will personally apply them;
62. plan various trips in terms of time requirements, precise routes and appropriate equipment;
63. describe the problems associated with the changing vehicle mix on today's highways;
64. identify the potential problems associated with driving small cars safely;
65. indicate awareness of the risks involved in driving, their causes and solutions;
66. Identify the function of traffic laws and enforcement;
67. list the ways a driver can contribute to system improvement in relationship to traffic law enforcement;
68. define the functions and problems of traffic engineering as related to the driving task;
69. discuss why driving is a privilege, not a right; and
70. identify the responsibilities and obligations related to the possession of a driver's license.

Philosophy of Curriculum Guide

Human functions, mental as well as physical, are involved in performing the many tasks of driving. Regardless of whether the operator is negotiating a curve, passing another vehicle, or parking, he or she must read the traffic scene, make predictions and decisions, and implement those decisions. Competency depends upon the operator's proficiency in performing these functions.

The human functions of driving (identify, predict, decide, execute) serve as the fundamental, essential elements of the driving task. They interact and are interrelated.

Identify—The first of the basic functions of the driving task is to acquire and maintain a clear, complete and accurate picture of the traffic scene in order to detect any critical objects or changes which may require compensatory actions.

Vision is the primary medium through which the driver acquires information. For optimum information acquisition, the operator needs to use a consistent and systematic search pattern. This pattern includes continuously scanning roadway location and characteristics, movement of other highway users, traffic control signs and signals, and the vehicle's instrument panel and mirrors. Although an effective search pattern encompasses the total traffic scene (front, back and sides), it concentrates on those sectors in proportion to the likelihood of hazards. The "brief glance" technique enables a driver to maintain awareness of conditions to the side and behind while concentrating on conditions ahead.

Which stimuli are selected and identified depends upon (a) the position, intensity, color, contrast and movement of the stimuli; (b) the degree of threat from the stimuli; (c) the previous experiences and learning of the driver, and (d) the motive and motions of the driver in play at the time.

The exact word used to describe this function is not important as long as it pertains to a systematic and logical analysis of the traffic environment. Some instructors may prefer to use labels such as perception, observation, recognition or discernment to describe this process. In any case, the person senses information.

Predict—After drivers identify the important elements of the traffic scene and their relationships to each other, they must project and predict possible future relationships and outcomes, constantly hypothesizing about what will or might be. Drivers must correlate what has been identified regarding people-machine-environment relationships with stored knowledge and insights relative to traffic laws, human characteristics, vehicle dynamics, physical forces and roadway or traffic conditions.

When the driver is in a driving situation with no other highway users nearby, the predicting process is primarily directed toward the physical principles involved in the people-machine-environment. When others share the highway, drivers must predict the probable actions of others. The actions of many drivers are unpredictable; consideration should therefore be given to what the other driver might do.

Expecting and being prepared for the unexpected or the worst behavior on the part of others usually will afford you the time and space to take evasive action. It is better to assume the worst and not have it happen than to ignore the worst and have it occur.

In predicting the actions of other highway users, the driver is aided by a set of rules and norms which serve to coordinate the interaction of highway users by utilizing right-of-way laws, speed controls, lane markings, and signs and signals. The validity of a driver's predictions increases in relation to the accuracy of communications occurring between highway users.

While good drivers will be guided by expectations concerning the behavior of others, they will avoid full commitment to assumptions and will be prepared to adjust in case the predictions are not borne out.

Other words to describe this process could be: expect, anticipate, calculate, presume, foresee, premonition of, and evaluate.

Decide—Formulating a course of action makes up the decision-making function in operating a motor vehicle. Drivers make decisions about driving on the basis of their predictions.

The complexity of the traffic environment generates many and varied decisions ranging from very minor to highly complex. Simple and routine decisions need to become habitualized or automatic, thus allowing additional time for more difficult decisions. The time allotted to the decision process decreases as the number of choices increases. As driving becomes more complex, the decisions to be made greatly increase. To compensate for this, drivers should allow a greater space cushion and decrease their speed. The key to good decision making is speed control and proper vehicle positioning.

The decision process is also one of resolving, determining, concluding, selecting or adopting a given course of action.

Execute—The functions of identification, prediction and decision culminate in a performance function as the driver executes a decision or takes a thought-out action. Many of these actions soon become habits.

The exact action to be taken depends largely upon the situation at the time. Whatever the action may be, it will involve one of the following: (1) regulating power and velocity; (2) manipulating steering wheel for steering control; (3) manipulating accelerator and brake for slowing and stopping, and (4) communicating and signalling.

The time allotted for the human functions of identification through execution is directly related to speed and quality of the information processed. Good drivers will anticipate and compensate for an impending threat rather than rely on their reaction time.

Other terms to describe the action function might include: to put into operation, to enact, to perform, to act upon, to proceed.

The human functions are applicable to all aspects of the curriculum. They apply not only to driving tasks but also to the process of self and system improvement. Therefore, they should be continually stressed with each unit. These functions serve as the fundamental concepts for the curriculum.

Not all learning in traffic education can be measured at the end of a course or, for that matter, at any time in the life of the driver. Much of what a teacher of traffic education should be teaching is internal or unobservable in the student. This is particularly true of beliefs, attitudes and values. A good instructor will strive to have students incorporate their learning into their value systems. Self-regulation in driving due to a sound value system far exceeds any imposed regulatory system. The aim of every traffic education class should be to help students implement those principles of driving into a value system that contributes to the individual and to society.

Structure & Format of the Curriculum Guide

Section—The guide is divided into three sections. Each section contains units which relate to the central theme of that section.

Section I: Traffic Environment Tasks
This section comprises the basic tasks of driving and interacting with other highway users. Handling critical situations and prevention of accidents are stressed as a part of traffic environment.

Section II: Readiness Tasks
This section of the guide assesses the mental, physical and emotional fitness of the driver. Vehicle readiness and contemporary driving are all part of the readiness tasks.

Section III: Improvement Tasks
The final section of the guide discusses ways to become a better driver through self-analysis and improvement. Program improvement is also included as a part of the improvement tasks.

Unit—A unit is composed of related concepts. Each concept within the unit contributes to the overall purpose of the unit.

Concept—A concept is a composite of related segments. Each concept has a section of content material to aid instructors in selecting and programming course matter. Learning guides for use by students are also a part of each concept. These guides help to develop the knowledge and skills contained in the concept. Each concept has a governing principle which is an overall objective for that concept. A pre/post assessment designed to determine individual and/or final achievement levels can be found at the end of each concept. A list of instructional materials is included with each concept.

Segment—Each segment is a subpart of the concept. Each contains objectives or student behavior important for development of drivers. Learning activities are included with most segments. These are only suggestions. Teachers should select their methods on the basis of individual capabilities, available time, and resources.

Textbooks Used as References for the Curriculum Guide

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Traffic Education Topical Outline

Introduction

Section 1: Traffic Environment Tasks

Unit A: Basic Control Tasks

Concept:
1.0 Driver and Vehicle Interaction
Segment:
1.1 Vehicle Familiarization
1.2 Pre-start and Starting Procedures
1.3 Securing the Vehicle
1.4 Turns
1.5 Backing
1.6 Entering the Roadway

Concept:
2.0 Vehicle and Road Surface Interaction
Segment:
2.1 Friction
2.2 Traction
2.3 Road Surface Factors
2.4 Tires
2.5 Road Shapes

Concept:
3.0 Directional Control
Segment:
3.1 Line of Sight
3.2 Steering and Suspension System
3.3 Weight, Space and Vehicle Profile
3.4 Two-Wheeled Vehicles
3.5 Blind Spots

Concept:
4.0 Speed Control
Segment:
4.1 Source and Transmission of Power
4.2 Acceleration
4.3 Deceleration
4.4 Cornering
4.5 Speed Choice
4.6 Speed Laws

Concept:
5.0 Braking and Stopping
Segment:
5.1 Kinetic Energy
5.2 Normal Braking
5.3 Locked Wheel Stop
5.4 Braking Distance
5.5 Stopping Distance
5.6 Braking Techniques

Concept:
6.0 Traffic Signs, Signals and Pavement Markings
Segment:
6.1 Purpose of Signs
6.2 Color of Signs
6.3 Shape of Signs
6.4 Signals
6.5 Pavement Markings

Unit B: Interacting with Other Highway Users

Concept:
- 1.0 Visual Impairments

Segment:
- 1.1 Structure and Function
- 1.2 Clean Windshield and Windows
- 1.3 Visual Obstructions
- 1.4 Climatic Conditions
- 1.5 Driving at Night

Concept:
- 2.0 Distractions

Segment:
- 2.1 Environmental Distractions
- 2.2 Within Vehicle Distractions

Concept:
- 3.0 Movement Within Traffic Flow

Segment:
- 3.1 Following Other Vehicles
- 3.2 Being Followed by Another Vehicle
- 3.3 Meeting an Oncoming Vehicle
- 3.4 Passing and Being Passed
- 3.5 Lane Changing
- 3.6 Turnabout
- 3.7 Parking

Concept:
- 4.0 Intersections

Segment:
- 4.1 Approach
- 4.2 Railroad Crossings

Concept:
- 5.0 Pedestrians and Animals

Segment:
- 5.1 Crosswalks and Laws
- 5.2 Types of Pedestrians
- 5.3 Critical Areas
- 5.4 Pedestrian Responsibilities
- 5.5 Animals

Concept:
- 6.0 Driving Variations

Segment:
- 6.1 City Driving
- 6.2 Residential Driving
- 6.3 Rural Driving
- 6.4 Freeway Driving

Unit C: Critical Situations

Concept:
- 1.0 Control of Vehicle

Segment:
- 1.1 Traction Loss
- 1.2 Vehicle Malfunctions

Concept:
- 2.0 Adverse Weather Driving

Segment:
- 2.1 Snow and Ice
- 2.2 Rain
- 2.3 Wind
- 2.4 Fog

Unit D: Accident Prevention

Concept:
- 1.0 Highway Accidents

Segment:
- 1.1 Traffic Accident Facts
- 1.2 Accident Records
- 1.3 Accident (Definition)
- 1.4 Multiple Causes

Concept:
- 2.0 Minimizing Impact Forces

Segment:
- 2.1 Impact Forces
- 2.2 Packaging
- 2.3 Motorbike Operator Vulnerability
- 2.4 Highway Design
- 2.5 Vehicle Design

Concept:
- 3.0 Vulnerability of Small Cars

Segment:
- 3.1 Small Cars vs. Large Cars
- 3.2 Small Car Occupancy
- 3.3 Survival Space
- 3.4 Ground Clearance
- 3.5 Visibility
- 3.6 Highway Hazards
- 3.7 Small Cars and Large Trucks

Concept:
  4.0 Occupant Restraint
Segment:
  4.1 Crashworthiness
  4.2 Restraint Systems
  4.3 Manual Active Restraints
  4.4 Automatic Passive Restraints
  4.5 Child Restraints
  4.6 The Human Collision

Concept:
  5.0 Collision Scene
Segment:
  5.1 Stopping
  5.2 Marking and Controlling the Scene
  5.3 Assisting the Injured
  5.4 Words and Deeds
  5.5 Accident Reporting

Concept:
  6.0 Financial Responsibility
Segment:
  6.1 Nature of Insurance
  6.2 Liability
  6.3 Liability Insurance
  6.4 Physical Damage Insurance
  6.5 Special Insurance Coverage
  6.6 Factors Influencing Insurance Premiums
  6.7 Young Driver Rates

Section II: Readiness Tasks

Unit A: Operator Fitness

Concept:
  1.0 Alcohol
Segment:
  1.1 Absorption, Distribution and Oxidation
  1.2 Effect on Body Functions
  1.3 Variables
  1.4 Influence on Driving Performance
  1.5 Motivations-Decision
  1.6 Accident Data
  1.7 Legislation and Enforcement

Concept:
  2.0 Drugs
Segment:
  2.1 General Types
  2.2 Drugs and Medicines
  2.3 Guidelines

Concept:
  3.0 Emotions
Segment:
  3.1 Emotions and Driving
  3.2 Handling Emotions
  3.3 Motivations for Driving

Concept:
  4.0 Fatigue and Carbon Monoxide
Segment:
  4.1 Causes of Fatigue
  4.2 Effects of Fatigue
  4.3 Handling Fatigue
  4.4 Carbon Monoxide

Concept:
  5.0 Other Impairments
Segment:
  5.1 Compensations for Handicaps
  5.2 Age Factors
  5.3 Driver Licensing Standards

Unit B: Vehicle Readiness

Concept:
  1.0 Management and Maintenance
Segment:
  1.1 Owner Responsibility
  1.2 Signs and Symptoms
  1.3 Preventive Maintenance
  1.4 Operating Conditions
  1.5 Choosing a Service Agency
  1.6 Vehicle Selection
  1.7 Vehicle Title and Registration

Concept:
  2.0 Energy Conservation
Segment:
  2.1 Fuel Conservation
  2.2 Determining Transportation Needs
  2.3 Vehicle Fuel Economy Factors
  2.4 Fuel and Oil Selection
  2.5 Tire Care
  2.6 Economic Driving Techniques
  2.7 Speed Management

Unit C: Contemporary Driving

Concept:
  1.0 Trip Planning and Driving Inventory
Segment:
  1.1 Alternatives to Driving
  1.2 Route Selection
  1.3 Equipment
  1.4 Pre-Driving Inventory
  1.5 Economic Factors

Concept:
  2.0 The Changing Vehicle Mix
Segment:
  2.1 Vehicle Mix
  2.2 Other Travel Modes
  2.3 Small Car Dominance
  2.4 Vehicle Changes
  2.5 Small Car Classification

Concept:
3.0 Driving Small Cars Safely
Segment:
3.1 Occupant Restraint Use
3.2 Instrument Panel Familiarization
3.3 Acceleration
3.4 Manual Shifting
3.5 Steering Response Differences
3.6 Wind Factors
3.7 Front-Wheel Drive
3.8 Following Distances
3.9 Hatchback Hazards

Section III: Improvement Tasks

Unit A: Self-Improvement

Concept:
1.0 Risk Acceptance
Segment:
1.1 Risk Assessment
1.2 Individual Differences
1.3 Group Influence
1.4 Other Influences

Concept:
2.0 Self-Analysis and Improvement
Segment:
2.1 Self-Concept
2.2 Young Drivers
2.3 Assets and Liabilities
2.4 The Driving Environment
2.5 Vehicle Influence
2.6 Improvement Factors
2.7 Do-It-Yourself
2.8 Safety For . . .

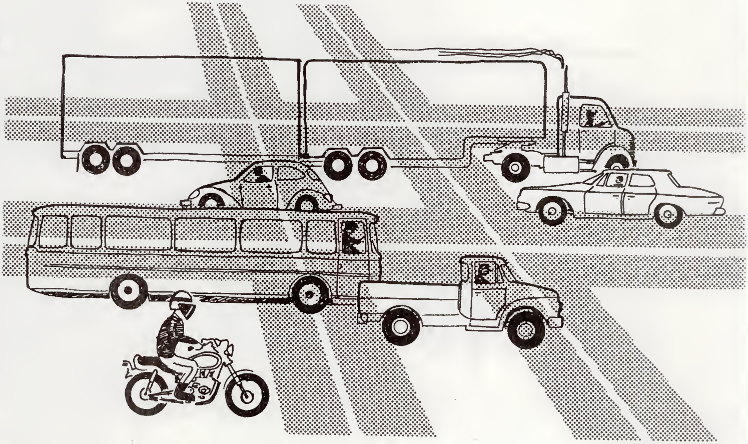
Unit B: System Improvement

Concept:
1.0 Traffic Law Enforcement
Segment:
1.1 Kinds of Traffic Laws
1.2 Conformity
1.3 Quality Enforcement
1.4 Police Traffic Supervision
1.5 Violator-Police Relationship
1.6 Traffic Courts

Concept:
2.0 Traffic Engineering
Segment:
2.1 Traffic Engineering Function
2.2 Turbulence
2.3 Uniformity
2.4 Warrants
2.5 Tools
2.6 Techniques
2.7 Public and Individual Rights
2.8 Pressures on Traffic Engineers

Concept:
3.0 Driver Licensing
Segment:
3.1 Driving Privilege
3.2 Qualifications
3.3 Types of Licenses
3.4 License Revocation

Section I:
Traffic Environment



Unit A:

Basic Control Tasks

Unit A:
Basic Control Tasks

Concepts:

1.0 Driver and Vehicle Interaction

2.0 Vehicle and Road Surface Interaction

3.0 Directional Control

4.0 Speed Control

5.0 Braking and Stopping

6.0 Traffic Signs, Signals and Pavement Markings

Content

Learning Guides

Pre/Post Assessments with Answers

Reference and Resource Materials

Unit A: Basic Control Tasks

1.0 Driver and Vehicle Interaction

Principle: Before students are involved in the first driving experience, they need to become familiar with the controls, gauges, and safety devices of the automobile. This will not only help them develop and improve their driving skills, but will allow them to do so with a greater degree of confidence and safety. Pre-starting and starting procedures should develop into habits that can last a lifetime. Development of skills in turning and movement will lay the foundation for more complex skills. Attention should be paid to these beginning skills and habits.

1.1 Vehicle Familiarization

Objectives/ Student Behavior: The student will perform the following:

a. Identify all driving controls.
b. Identify and explain gauges of the vehicle.
c. Identify and utilize safety devices.
d. Identify and adjust all visibility aids in the vehicle.

Learning Activities: Locate and explain the purpose of the vehicle's controls, gauges, and the proper use of safety features.

1.2 Pre-Start and Starting Procedures

Objectives/ Student Behavior: The student will correctly operate the controls, gauges, and safety features required in pre-start procedure. The student will be able to perform the pre-start procedure and start the vehicle.

Learning Activities The student will study and complete Learning Guide 1. Discuss and clarify procedures for pre-start and starting the vehicle with special attention directed toward gear selection, brake coverage, seat and mirror adjustments. Have students complete Learning Guide 2.

1.3 Securing the Vehicle

Objectives/ Student Behavior The student will be able to verbalize and then execute the procedure for moving, returning to curb, and securing the vehicle. When leaving the vehicle, the student will check the blind spot before opening the door. Locking the vehicle reduces the possibility of theft.

Learning Activities: Discuss moving, stopping and securing procedures; then have each student demonstrate the procedure prior to driving. Discuss the importance of gear shift lever in park position (automatic drive) and parking brake on when the vehicle is stopped for any length of time. Complete Learning Guides 3 and 4.

1.4 Turns

Objectives/ Student Behavior:	The student will be able to explain the procedure for a right and left turn. The student will be able to complete right and left turns in the vehicle.
Learning Activities:	Discuss turning in controlled and uncontrolled intersections; signalling; recovery; friction point; why there is more control with the hand-over-hand technique. Complete Learning Guide 5.

1.5 Backing

Objectives/ Student Behavior:

The student will be able to describe the process of backing a vehicle in relationship to speed, braking and steering. A student competent in backing should be able to:

a. Back in a straight line;
b. Back around corners, and
c. Back through a planned route.

Learning Activities:

Discuss and clarify procedure for backing. Loosen seat and shoulder belts, position body to see path of travel, and place hand at top of steering wheel for maximum control. Turn steering wheel the direction the back of the vehicle should go. Discuss the use of the left foot covering brake when backing. Back in a straight line for a specific distance. Back around real or simulated corners to the right and left. Back through a line of markers weaving to the left and right not deviating more than one-half car width from the markers. Perform activity in off-street area to minimize possible dangers. Complete Learning Guide 6.

1.6 Entering the Roadway

Objectives/ Student Behavior	Student explains procedures for entering the roadway. The student will enter traffic only after completing visual search, signalling, and yielding activities. Student places vehicle in proper lane and adjusts speed to traffic flow.
Learning Activities:	Discuss and clarify procedure for entering the roadway. Discuss entering traffic flow with emphasis on visual search and speed control. Complete Learning Guide 7.

Content

1.0 Familiarization of the vehicle will give students confidence and allow them to concentrate on the actual driving experience without undue worry over the gauges and controls.

1.1 It is important not only to know how a control functions, but also where it is located.

A. Ignition switch is located on the dashboard or on the steering column. When turned to "on" position, it turns on the electrical system of the car. Locking the car in the "off" position locks the steering wheel in most cars.

B. Steering wheel is located on the left side (unless specially built or from another country) and turns the front wheels allowing the driver to steer the car.

C. Foot brake is located on the floorboard next to the accelerator. Application of the brake places pressure on the brake drums and slows down the vehicle.

D. Accelerator is located on the right side of the floorboard. When depressed, it allows a greater amount of fuel to be used, creating more combustion and increasing the energy.

E. Gear selector lever (automatic) will indicate which gear the automobile is in. This lever can be mounted on the steering column or on the raised area to the right side of the driver's seat. Gears for automatic cars are: P (Park), R (Reverse); N (Neutral); D (Drive) 2 and 1—these are for lower forward gears. In some cars the 1 and 2 will be replaced by L (Low). Gears for a standard transmission conform to an "H" pattern and include R (Reverse), 1, 2, 3, and sometimes 4 and 5 forward gears.

F. Clutch (standard) is located to the left side of the foot brake and disengages the engine when depressed. When the clutch is released, the power of the engine is allowed to turn the wheels.

G. Parking brake is located on the side of the dash as a foot pedal or on the raised area to the right of the driver's seat. When applied it locks the brakes of the automobile and keeps it stationary.

H. Vehicle gauges or indicator lights tell the driver what is happening concerning the engine of the automobile.
   1. Fuel gauge—indicates amount of fuel
   2. Temperature gauge—registers the temperature of the engine
   3. Oil gauge—shows the oil pressure in the engine
   4. Ammeter—shows the amount of electric current being used by the engine

I. Some features of the automobile are for the safety and convenience of the passengers:
   1. Seat belts
   2. Mirrors (outside and inside)
   3. Sun visors
   4. Tinted windows
   5. Seat adjustment
   6. Door locks
   7. Head restraints
   8. Adjustable steering
   9. Parking lights
   10. Headlights (bright, dim)
   11. Dimmer switch, bright light indicator (usually located as a lever on left side of steering column)
   12. Back-up lights
   13. Dome lights
   14. Instrument panel light
   15. Turn signal indicators and lever

16. Flasher switch
17. Windshield wiper switch (usually located on same lever as the turn signals)
18. Window defrosters
19. Temperature controls
20. Horn
21. Speedometer and odometer

1.2 Pre-start and starting procedures will aid the driver in developing sound safety habits.

A. Before entering the car, the following should be done:
   1. Check tires—proper inflation, direction they are turned.
   2. Check for objects in path of car.
   3. Look for spots under the car that might mean the car is leaking.

B. Once inside the car, complete each of the following:
   1. Lock doors (helps keep people in and out).
   2. Adjust seat and head restraints.
   3. Adjust mirrors.
   4. Fasten safety belts.

C. When starting the car, the following points should be kept in mind:
   1. Parking brake should be set.
   2. Gear selector lever should be in "park."
   3. Turn ignition switch to "start."
   4. Check gauges after car starts.

1.3 When the drive is completed, the car should be secured. This eliminates any unintentional movements and helps prevent unauthorized car use.

A. When securing the automobile, the following should be completed:
   1. Gear selector lever should be in "park."
   2. Set parking brake. (When on a hill, set park brake before transmission park to take vehicle weight off transmission.)
   3. Shut down electrical accessories.
   4. Turn ignition to "off" or "lock."
   5. Remove key from ignition.
   6. Release safety belts.
   7. Step out of car and lock door.

B. Before leaving a parked automobile from the driver's side, a person should check for traffic; then look again after opening the door slightly.

1.4 A major part of driving involves turning. Development of turning skills will not only increase efficiency, but will do so more safely.

A. The automobile will go in the direction the steering wheel is turned.
   1. When backing, the rear wheels go the direction of the turned wheel.

B. Hand positioning on the steering wheel should be at the 9 and 3 positions of a clock.

C. A hand-over-hand turning technique is employed to turn the steering wheel. This method gives the driver optimum control of the vehicle.
   1. Begin a turn by pulling the steering wheel down with one hand; the hand opposite the turn aids in this process.
   2. When the hand opposite the direction of the turn reaches the original position of the hand in the direction of the turn, then cross the first hand over and grip the top of the steering wheel and continue turning them in the direction of the turn.
   3. As the vehicle moves into the desired new direction, hold your hands at the "friction point," allowing the steering wheel to return to its normal position.
   4. Application of the accelerator at the proper moment and "countersteering" may be needed to have the wheel return.
   5. Power steering makes the vehicle turn without as much effort from the driver.

D. An important aspect of turning is "seeing around the turn." The driver aims or looks at the intended path.

1.5 Backing an automobile not only includes all the skills of steering, but introduces some new techniques.

A. A driver's ability in backing is primarily related to body positioning and vision.
   1. Grip the top of the steering wheel with left hand.
   2. Rotate your body so your back is toward the door and you can see through the back window. Do not rely on mirrors in backing an automobile. Recheck forward now and then.
   3. Place right hand over the back of the seat.
   4. Remain looking out the back until you apply the brake; then turn around.
   5. Sharp turns around corners may require use of both hands.
   6. Left foot braking may be necessary because the body is turned to enhance vision.

1.6 Entering the roadway should be done in such a manner that it will not disrupt traffic flow or create a hazard.

A. Entering traffic involves visual searching, signalling and yielding activities.
   1. Checking traffic and finding an empty space is a necessity.
   2. Signalling your intentions lets other drivers know what you are going to do.
   3. Traffic on the roadway has the right-of-way and you must yield.

B. Entering a roadway should be completed at a speed that fits in with the existing traffic flow.

Learning Guide 1

Pre-Start

Task	Rationale
1. Check around car for possible dangers.	Obstruction surrounding or under the vehicle. Clear windows in winter. Check for traffic if entering from traffic side.
2. Doors (unlock).	To enter vehicle.
3. Car (lock doors)	Additional protection in the event of collision and against unauthorized entries. (In wrecked vehicles you have seen, were the doors open? Why?)
4. Key (place in ignition)	 Which key enters the ignition? Which side of key is up? What is the other key for? How do keys differ with various makes of vehicles?
5. Seat (adjust)	To be able to sit comfortably behind the steering wheel and allow for maximum control. Remember, accelerator is the greatest distance from the driver.
6. Mirrors (adjust)	To gain maximum field of vision and sight distance to rear and sides.
7. Head restraints (adjust)	To minimize neck injury, level directly across from top of ear. (What does the word whiplash mean?)
8. Seat and shoulder restraints (adjust).	To prevent you from being thrown about or out of the car. Adjust seat and shoulder restraints snugly across hips and chest. (Can you reach the parking brake? Release?)
9. Adjust ventilation.	

Learning Guide 2

Starting

Task	Rationale
1. Parking brake (on)	If parking brake is firmly set, will the car move? What wheel does this brake control? How do you release parking brake? Should parking brake be used year-round in Montana?
2. Foot brake (cover)	Prevent car from moving before you are ready.
3. Shift ("P")	Most automatic transmission cars will not start in any gears except park or neutral. (Where are these gears located on the selector indicator? How does park differ from neutral?)
4. Automatic choke (set if cold)	Choke controls fuel-air mixture entering carburetor to facilitate burn.
5. Key (on)	Key necessary to unlock steering control and start vehicle.
6. Gauges (check)	Gauges provide certain information concerning the mechanical condition of the vehicle.

Learning Guide 3

Return to Curb

Task	Rationale
1. Mirrors (check)	Reveals traffic conditions behind you and to the sides. (Do mirrors eliminate the need for a head check of blind spots?)
2. Signal (on)	Informs others of your intentions.
3. Blind spot (glance)	A head check is the only way blind spots are eliminated.
4. Steer (slight)	Be careful of over-steering; only a slight turn is necessary.
5. Recovery	As you approach the curb, steer so vehicle will be parallel to curb.
6. Brake (smooth)	Progressive braking eliminates jerky stops; also informs others of your intentions to stop vehicle.
7. Signal (cancel)	Slight recovery may not automatically cancel signal.

Learning Guide 4

Securing

Task	Rationale
1. Shift ("P")	Locks back wheels.
2. Parking brake (on)	Additional safety. Locks rear wheels. On hills set park brake first to take vehicle weight.
3. Accessories and controls (off)	Some accessories will still function with key in off or lock position. Vehicles will start easier if air conditioner is turned off before stopping.
4. Key (off and remove)	Shuts off power supply. Take keys so they won't be left in the car.
5. Seat and shoulder restraints (secure)	Shoulder belt replaced in carrier.
6. Vehicle (close windows, lock doors)	Protection against weather and theft. (When might you want to leave a window slightly cracked?)

Learning Guide 5
Turns

Task	Rationale
1. Lane (placement)	Car must be near and parallel to right curb or shoulder for right turns, and parallel to center line for left turns.
2. Signal (on)	Inform other drivers of your intentions. (Is signaling too far in advance of turn dangerous? What are hand signals for left turn, right turn, slowing? Are they standardized nationwide?)
3. Mirrors (check)	Is anyone approaching? Can you safely position your car for the turn?
4. Traffic (check)	Check traffic forward, left, center, then right. (Is anything coming into the intersection from any direction? Who has the right-of-way at the intersection? Is it controlled or uncontrolled?)
5. Blind spot (check)	Check blind spot to see if anything is about to pass your car as you are turning.
6. Car position	Right turn from right—most permissible to right lane. Left turn from left—most permissible to left lane. (What dangers do you see in crossing traffic lanes while turning?)
7. Brake (slow)	Be ready for the unexpected! This will cut down reaction time. Controlled braking is a necessity in turning.
8. Steer (turn)	Hand-over-hand gives better control. (Can you change direction quickly if necessary?)
9. Recovery (straighten)	Do steering wheels in all cars return to center steer by themselves?
10. Accelerate	Blend with traffic flow and regain lost speed.

Learning Guide 6
Backing

Task	Rationale
1. Starting	
2. Lap/shoulder restraints (loosen)	To enable driver to assume proper position.
3. Traffic (check)	Where will the vehicle go if the steering wheel is turned left? If turned right? Is traffic approaching? If so, will it create a hazard?
4. Brake (on)	To prevent any motion of car until driver is ready to move.
5. Shift ("R")	Only gear for backward motion.
6. Parking brake (release)	The car will then be free to move.
7. Position (direction of turn)	Backing left—right hand at 12:00, look over left shoulder and through rear window. Backing right—left hand at 12:00, look out right side of vehicle, through rear window, over right shoulder.
8. Brake (release and cover)	Freeing car for movement.
9. Accelerator (control)	Press pedal gradually to move the vehicle under controlled conditions.
10. Stop (fully)	When backing, keep eyes looking back until vehicle has completely stopped to prevent vehicle from hitting obstructions in rear.

Learning Guide 7

Entering Roadway

Task	Rationale
1. Brake (firmly)	Holds vehicle motionless until ready to proceed. (If foot brake is applied, how many wheels on the auto are affected?)
2. Shift ("D")	This will put the vehicle in forward motion gear. (What other gears will provide forward motion?)
3. Traffic (check forward)	What possible traffic might you see approaching?
4. Traffic (check rear and sides)	To avoid conflicts from the rear and sides.
5. Signal (on)	To show direction of movement away from curb into flow of traffic.
6. Blind spot (check)	To avoid conflicts impossible to see in mirror. (Where are the blind spots of your vehicle?)
7. Parking brake (release)	Prevents car from moving when vehicle is parked.
8. Accelerate (gently)	How do road design and surface affect amount of acceleration needed?
9. Steering (slightly)	Turn steering wheel to position vehicle properly in driving lane.
10. Lane position (select)	Drive in lane to fit driving situation. (What is meant by centering in your lane?)

Pre/Post Assessment

Driver and Vehicle Interaction

1. The accelerator is located on the left side of the floorboard in most cars.
   _____True _____False

2. The primary purpose of the parking brake is to use in an emergency when regular brakes fail.
   _____True _____False

3. Turning the ignition switch to the "on" position will start the engine.
   _____True _____False

4. Oil pressure within the engine will be indicated by a gauge or warning light.
   _____True _____False

5. When backing, the rear end of the car goes the opposite direction from which the steering wheel is turned.
   _____True _____False

6. What is the proper sequence once inside the automobile?
   _____A. Lock doors, adjust seat, adjust mirrors, fasten belts.
   _____B. Fasten belts, adjust mirrors, adjust seat, lock doors.
   _____C. Adjust mirrors, adjust seat, fasten belts, lock doors.
   _____D. Fasten belts, adjust seat, adjust mirrors, lock doors.

7. Which of the following safety features would be the most beneficial?
   _____A. Flasher switch
   _____B. Tinted windows
   _____C. Adjustable steering
   _____D. Window defrosters

8. If a driver wishes to turn but is in the improper lane he should:
   _____A. Turn from the wrong lane if no one is coming from the rear.
   _____B. Stop where he is and think over the situation.
   _____C. Cut abruptly and suddenly into correct lane for the turn.
   _____D. None of the above.

9. What is the purpose of adjusting rear and side mirrors?
   _____A. Proper visual perception.
   _____B. Check passengers in the back seat.
   _____C. It is required in pre-drive.
   _____D. All of the above.

10. When making a right-hand turn, why do inexperienced drivers often run over the curb?
    _____A. They turn the corner at too great a speed.
    _____B. Their speed is too slow around the corner.
    _____C. They fail to realize how the rear wheels function in a turn.
    _____D. All of the above.

Pre/Post Assessment Answers

Driver and Vehicle Interaction

1. False
2. False
3. False
4. True
5. False
6. A
7. D
8. D
9. A
10. C

Appropriate Instructional Materials

Driver and Vehicle Interaction

Filmstrip:
"Driving Maneuvers, Procedures and Habits," 106 frames, 23 min., Bumpa-Tel.

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Unit A: Basic Control Tasks

2.0 Vehicle and Road Surface Interaction

Principle: The operator communicates with the vehicle and the roadway through control of steering, acceleration and braking. Whether or not the vehicle responds as anticipated depends upon the effectiveness of the control devices plus the friction between the tires and the road surface. An understanding of the concepts and the principles related to tire-roadway interaction will help the young driver maintain equilibrium between the vehicle and the roadway. The purpose of this concept is to develop that prerequisite understanding.

2.1 Friction

Objectives/ Student Behavior: Classify the kinds of friction (static, sliding, rolling and internal) and the general conditions that determine the amount of friction between two surfaces.

Learning Activities: Demonstrate sliding and rolling friction by sliding an object on a surface, then rolling it on wheels on the same surface.

2.2 Traction

Objectives/ Student Behavior: Describe the role of traction in maintaining vehicle control.

Learning Activities: Obtain two tires—one well-worn (bald) and one with good tread. Push tires down on a flat surface and let students see the difference in traction or gripping ability of each tire.

2.3 Road Surface Factors

Objectives/ Student Behavior: When shown pictures of roadways, identify and appraise conditions that influence the gripping efficiency of the roadway.

Learning Activities: Obtain photos of roadway surfaces including rain, snow, sand and/or gravel, oil, wet leaves, etc. Discuss with students the potential problems when these substances are on a road surface.

2.4 Tires

Objectives/ Student Behavior:	When given a series of situations related to tire selection and condition, identify the implications for traction.
Learning Activities:	Obtain sections of tires including bald tires, tires with alignment problems, tires with full, medium and little tread, snow tires and tires with uneven tread wear. Have students examine these tire sections and discuss traction implications. Discuss the effects of studs and tire chains.

2.5 Road Shapes

Objectives/ Student Behavior:	When shown pictures of various road shapes (crowned, level, banked, reverse bank), indicate the effect these shapes have on vehicle movement.
Learning Activities:	Have students complete Learning Guide 8.

Content

2.0 Control of vehicle movement depends substantially upon the friction on small spots where the flattened out part or "footprints" of the tires contact the roadway.

2.1 Friction is the resistance to motion between two surfaces.

A. Four basic kinds of friction are:
   1. Static friction—the holding force between two surfaces at rest;
   2. Sliding friction—the resistance to motion between two surfaces which are moving across each other (somewhat less than static friction);
   3. Rolling friction—the resistance to motion of a rolling object like a ball, cylinder or wheel (small compared to static or sliding friction, which is the reason for using wheels instead of sled runners); and
   4. Internal friction—the resistance to motion within elastic objects (tires get warm from internal friction as they flex).

B. Amount of friction between two surfaces depends upon the:
   1. substance of the material—metal, wood, rubber (the softer the material, the more friction);
   2. roughness of the surfaces (the rougher the surface, the more friction);
   3. amount of force pushing the surfaces together (the more force, the more friction); and
   4. presence of "lubricants"—oil, water, leaves, etc., which tend to spread the surfaces apart, thereby reducing friction.

C. Amount of friction between two surfaces (coefficient of friction) is calculated by dividing the amount of force necessary to pull one surface over another by the amount of force pressing the two surfaces together (weight).

2.2 Traction (adhesive friction) is essential to vehicle control.

A. Traction is needed on the drive wheels to make the vehicle go, on the front wheels for steering, and on both front and rear wheels for directional control and braking.

B. A spinning wheel (sliding friction) does not provide as much traction as a rolling wheel; therefore, the skill of starting a car on a slippery surface lies in applying the power to the drive wheels so they do not lose their grip on the surface.

C. It takes more force to start a vehicle moving than it does to maintain movement because:
   1. static friction is greater than sliding friction, and
   2. inertia must be overcome. (A body at rest tends to remain at rest.)

D. Normally, a vehicle moves in the direction the wheels point, because the "rolling friction" of wheels moving forward or backward is much less than the "sliding friction" of side movement. Exceptions are:
   1. When centrifugal effect in a turn is greater than the frictional force of the tires, the tires will slide sideways.
   2. When brakes are applied hard enough to slide the tires, there is no rolling friction.

E. Although traction is increased by the weight of a vehicle, a heavier vehicle will not stop in a shorter distance, because the added traction is balanced by the added inertia of that weight.

2.3 Many factors affect the gripping efficiency of road surfaces.

A. Surface materials (concrete, asphalt, gravel and dirt) have different coefficients of friction.

B. Dry surfaces have a much greater gripping efficiency than wet.

C. At the beginning of rain, particularly after a dry spell, the water combines with oil and dirt on the surface to form an emulsion that is extremely slippery.

D. Loose sand and gravel, stone chips, mud, wet leaves, oil and grease tend to lower gripping efficiency.

E. Ice and snow provide very little frictional grip.

F. Ice patches under an overpass, around shaded curves and other spots blocked from the sun provide a deceptive hazard because they thaw more slowly. This is usually called "black ice."

G. Railroad tracks, steel bridge expansion joints, lattice-floored bridges, even dew on a metal manhole cover, create a traction problem for the operator of a two-wheeled vehicle.

H. As temperature rises within the freezing range, ice and snow become much more slippery. (Braking distance doubles with a temperature rise from 0 to 32° Fahrenheit.)

I. Bridges freeze before other road surfaces and also thaw first.

J. Bumpy washboard roads also greatly reduce the friction grip of tires on the road and result in difficult steering and braking. (The vehicle suspension system helps to keep the wheels on the road surface.)

K. Coefficients of friction are likely to be the lowest at approaches to intersections (a particularly bad place) from the wear of vehicles starting and stopping and also oil drippings from cars and trucks.

2.4 Tires are an integral part of the braking system, the steering system, and the drive train that transmits the power from the engine to the roadway.

A. Tire treads provide traction on wet surfaces by furnishing an outlet for water squeezed by the tire groovings as they cut into the film of water.

B. The groovings of tire treads also provide ventilation to combat heat build-up caused by friction of flexing treads.

C. Variance in tire tread depth and inflation pressure can create steering difficulties, instability and uneven braking. Rotating tires at regular intervals helps to equalize the wear of all five tires.

D. Letting air out of tires does not increase traction; in fact, it may even increase the tendency to skid on turns.

E. Both over-inflation and under-inflation of tires cause an improper contact with the road surface; they also cause excessive wear.
   1. Under-inflated tires cup in the center, causing shoulder wear and difficult steering, especially in cornering.
   2. Under-inflated tires overheat from friction caused by sidewall flexing, which reduces the strength and durability of the tires.
   3. Wear confined to the center of the tire indicates that the tire has been over-inflated.
   4. Over-inflated tires are easily damaged because the cords cannot flex and absorb road shock.

F. Snow tires (including studded tires) improve traction and stopping distance on ice and snow, but tire chains are even more effective under those conditions.

2.5 The shape of the road surface has an influence on vehicle movement.

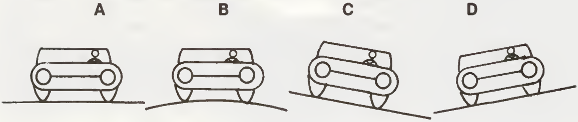
A. A crowned road surface allows water to drain away from the center of the road.

B. A banked road surface helps the vehicle hold the road when negotiating a curve.

C. The road surface will greatly influence the road holding ability, especially in ice and snow.

Learning Guide 8

Vehicle and Road Surface Interaction



Driving on a Highway

1. How would I expect a car to perform on each of the above roads?

   a. ______________________________

   ____

   b. ______________________________

   ____

   c. ______________________________

   ____

   d. ______________________________

   ____

2. What special dangers do each of the roads present?

   a. ______________________________

   ____

   b. ______________________________

   ____

   c. ______________________________

   ____

   d. ______________________________

   ____

3. When stopping in rain, what might I expect my car to do on roads "A" and "C"?

____

____

____

4. When stopping on snow-covered roads, what might I expect my vehicle to do on roads "C" and "D"?

____

____

____

5. What effect(s) does/do each of the illustrated road surfaces have on a vehicle negotiating a curve?

a. ____

b. ____

c. ____

d. ____

Pre/Post Assessment

Vehicle and Road Surface Interaction

1. Friction is the resistance to motion between two surfaces.
   _____True _____False

2. The greater the amount of traction, the shorter the distance needed to stop.
   _____True _____False

3. Materials that come between road surface and the automobile tires tend to lower the gripping efficiency.
   _____True _____False

4. Tire inflation pressure will have an influence on friction.
   _____True _____False

5. The shape of the road surface has little influence on the ability of a vehicle to remain on the roadway.
   _____True _____False

6. For which of the following would your tires have the least amount of gripping efficiency?
   _____A. On dry pavement.
   _____B. On wet pavement after it has rained for one hour.
   _____C. On wet pavement at the beginning of a rainstorm.
   _____D. On new pavement.

7. An automobile tire that gets warm due to resistance to motion is an example of:
   _____A. Traction.
   _____B. Rolling friction.
   _____C. Static friction.
   _____D. Internal friction.

8. A problem with bridges and overpasses during the winter is:
   _____A. Snow piles up at the sides, narrowing the road.
   _____B. Snow removal equipment is not very effective on bridges and overpasses.
   _____C. Snow tends to drift onto bridges.
   _____D. Bridge surfaces freeze and thaw before other road surfaces.

9. Which of the following has the greatest potential for loss of traction?
   _____A. Snow surface temperature 0°F.
   _____B. Snow surface temperature 31° F.
   _____C. Snow surface temperature 10° F.
   _____D. Snow surface temperature -10° F.

10. The groovings of tire treads serve what purpose?
    _____A. Prevent the tire from being punctured.
    _____B. Furnish an outlet for water and ventilate the tire.
    _____C. Help the tire to last longer.
    _____D. Give the tire more surface friction.

11. A banked road surface
    _____A. Allows water to drain off.
    _____B. Helps when negotiating a curve.
    _____C. Will cause a vehicle to slip toward the low side.
    _____D. Will cause uneven tire wear.

12. A road is crowned to
    _____A. Permit drainage.
    _____B. Assist in vehicle control.
    _____C. Neither of the above.

13. On what type of road would you have the best tire interaction with the road surface?
    _____A. Pavement
    _____B. Gravel
    _____C. Dirt

14. When driving on a flat, straight road, you lock the brakes and then attempt to make a sharp left turn. In what general direction will the vehicle proceed?
    _____A. Straight ahead
    _____B. Right
    _____C. Left

15. In turning a corner, which type of road is the safest?
    _____A. Crown
    _____B. Flat
    _____C. Banked

Pre/Post Assessment Answers

Vehicle and Road Surface Interaction

1. True
2. False
3. True
4. True
5. False
6. C
7. D
8. D
9. B
10. B
11. B
12. A
13. A
14. A
15. C

Appropriate Instructional Materials

Vehicle and Road Surface Interaction

"The Tire Safety Lesson," filmstrip, Instructors manual, pre-test and post-test by Tire Industry Safety Council, Suite 766, National Press Bldg., Washington, D.C. 20045.

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pp. 56-57, 63, 80, 185, 188, 198, 224, 226, 229, 310 (1977)
pp. 72-78, 89, 160, 212-217, 225, 296-297, 307-308 (1982)

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pp. 9-10, 76, 84-85, 130-136, 192-206

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Unit A: Basic Control Tasks

3.0 Directional Control

Principle: This concept will help the student examine the people-machine-roadway interaction with respect to directional control, as a means of developing capability to position the vehicle in selected paths on straight and curved roadways.

3.1 Line of Sight

Objectives/ Student Behavior: Explain why seating position, line of sight and manipulation of the steering control all influence the operator's ability to maintain directional control. The student will describe instances when correct lane position and placement should be altered. Student identification of conditions or situations which could force a car to cross into his lane.

Learning *Activities:* Discuss factors involved in keeping a car in the correct lane. Discuss the most common errors made when the driver loses correct lane positioning.
a. Drifting (what is drifting; what causes it?)
b. Over-correcting (what is over-correcting; what causes it?)

Students will identify the dangers of drifting, over-correcting and an off-center path. Complete Learning Guide 9.
Explore situations when lane position should be altered:
a. Meeting other vehicles.
b. Emergency situations.
c. Wide recreational vehicles.
d. Trucks.
e. Two-wheeled vehicles.
Instructor should involve all students in the car by asking such questions as "How do you predict the action of an oncoming car?"

3.2 Steering and Suspension System

Objective/ Student Behavior: Identify the symptoms and possible consequences on directional control of (a) front end misalignment, (b) defective steering mechanism, and (c) weak shock absorbers.

Learning Activities: Discuss:
a. What is the effect of worn-out shock absorbers?
b. What automotive design and features provide directional control?

3.3 Weight, Space, and Vehicle Profile

Objective/ Student Behavior: Relate weight, space and vehicle profile to directional control. The student will identify the problems of varying widths of cars and their relationships to traffic lanes.

Learning Activities: Analyze the problems of varying widths of cars and lanes for traffic.

3.4 Two-Wheeled Vehicles

Objective/ Student Behavior: Identify special problems relating to directional control which confront operators of two-wheeled vehicles.

Learning Activities: Discuss lane placement for bicycles and motorcyles with single riders and multiple riders.

3.5 Blind Spots

Objective/ Student Behavior: The student will identify "blind spots" when sitting in a vehicle.

Learning Activities: The instructor will demonstrate "blind spots." Take a white sheet of paper and make an ink spot in the center about the size of a pea. Hold the paper so the spot is at eye level, at arm's length in left hand. Close right eye. Stare straight ahead while slowly moving paper outward toward your side. Ink spot will disappear due to blind spot in the eye. Repeat for right side using right eye and right hand. Relate blind spots in the eye to blind spots in driving. Study Learning Guide 10.

Content

3.0 Reliable and accurate directional control depends upon multiple driver-vehicle-environmental factors interacting in a closely related manner.

3.1 Centering the line of sight down the path the car should travel and steering toward the center of this selected path will help to prevent over-steering and under-steering.

A. Good seeing begins with good seating.
   1. Sit erect and squarely behind the wheel with eye level well above the top of the steering wheel.
   2. To look backward is physically awkward, but it is the only way to get the whole picture when backing the vehicle.

B. Constant eye movement helps to prevent both the fixed and the blank stare ("captured attention"), enabling the driver to maintain continuous awareness of his relationship to the roadway.
   1. Center on the path ahead.
   2. Scan the scene continuously.
   3. Check mirrors and dash periodically.
   4. As speed increases, search farther ahead for environmental cues that may affect course of action.

C. Even on a straight road a car will not "hold the path" unless the driver is looking ahead, recognizing each movement away from the desired path, and making early corrections for each deviation (continuously steering).

D. Position of the hands on the steering wheel may vary with the design of the seat, the length of the driver's arms, muscular differences, and speed of travel. In any case the hand position should be where the driver can steer best.

3.2 Properly functioning and precise steering and suspension systems allow changes in direction to be made accurately and in close accord with movements of the steering wheel.

A. The steering system and front tires utilize friction to provide maneuverability.
   1. As the driver turns the steering wheel, the turning action is transmitted through a gear to the arm and rods that control the front wheels.
   2. When the front wheels are in proper alignment (angles at which wheels are positioned), they allow the tires to roll parallel to each other when traveling straight ahead without scuffing, dragging, or slipping. Misalignment can result from worn parts or hard jolts to the front end.
   3. A properly functioning steering system is particularly important in fighting cross winds, negotiating sharp curves, and during evasive actions in emergencies.
   4. Power steering, through reduced gear ratios, provides fast, positive steering under normal circumstances and also helps the driver to retain control under adverse circumstances (blowout, chuck holes, soft shoulder, etc.).
   5. A driver should be able to recognize any malfunctions of the steering system such as steering wheel "play," hard steering, pulling to one side, "shimmy," poor recovering and self-centering, noise and tire squeal.

B. Shock absorbers lend firm control over spring action and in so doing help to provide directional stability.

   1. Shock absorbers make it possible for tires to maintain a nearly continuous, firm contact with the road surface, to produce a smooth and comfortable ride.

   2. Shock absorbers have limited life and lose effectiveness gradually, which can be detected by: swaying on curves, uncontrolled wheel bounce and bottoming on bumps; excessive rocking and dipping motions when moderate stops are made; and lack of vehicle stability at highway speeds.

3.3 Weight, speed and vehicle profile influence directional control.

A. The effect of side wind forces increases as the weight of the car decreases, but a heavy vehicle is not immune to the effects of side wind (danger of sudden shifts of wind direction velocity; also the danger of driving into a headwind and then suddenly turning a corner).

B. Trailers, campers and vehicles with a cartop carrier are especially susceptible to wind forces due to their higher center of gravity.

C. As car speed increases, the angle decreases at which direction changes can be made safely. For example, a lane change at 15 mph could be made at a 45° angle while at 60 mph a smaller angle would be required.

3.4 Maintaining directional control on a two-wheeled vehicle requires a higher level of skill than driving an automobile. The rider and the vehicle act as a system to *control* and *balance* the machine.

A. Small bumps, obstacles in the road and other surface conditions which may not even be noticed by an automobile driver will frequently challenge the two-wheeled vehicle operator.
   1. Railroad tracks should be crossed as near to a 90° angle as possible to avoid skidding and catching the wheels in them.
   2. The more slippery the surface, the closer to vertical the vehicle should be kept.
   3. By driving to the left side of a roadway lane, the grease strip in the center of the lane and the bumps along the road edge can be avoided.
   4. If you have to hit a small obstacle or bump, hit it head-on, grasp the handlebars firmly, and raise slightly from seat to protect your spine from the jar.

B. If articles are carried in a saddle bag or a carrying rack, *both* hands are free for using controls and maintaining good balance. Although a rider may feel secure riding with one hand, he cannot handle the slightest emergency.

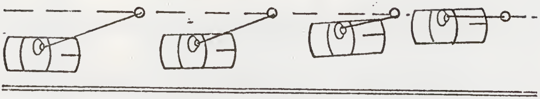
3.5 When sitting in an automobile and looking straight ahead, there are certain areas one's vision will not cover. These areas are known as blind spots.

A. The eye has a natural blind spot.
B. Certain structures of the vehicle itself can prevent or block the driver's vision.
   1. Door posts
   2. Rearview mirror
   3. Roof supports

C. It is necessary to compensate for the blind spots by turning the head and extending the visual pattern.

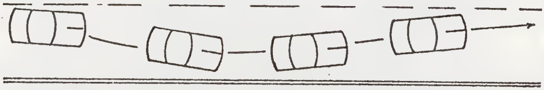
Learning Guide 9
Lane Placement

Drifting



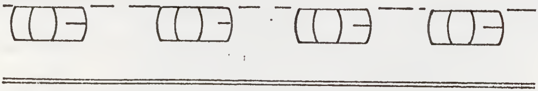
Drifting is caused when drivers focus their attention on one edge of the intended path and watch the movement of their front fender in relation to that edge. This practice frequently results in a tendency to steer in the direction in which the driver's attention is focused.

Overcorrecting



Overcorrecting or weaving is caused when the driver turns the steering wheel further than is necessary to move the car back on the path or it may involve failing to straighten out the wheels once the car is back in the center of its path. Small corrections will bring the car *gradually* back in its path. *Wait* for the vehicle to gradually return to its path. Smaller corrections in steering help to reduce the tendency to weave.

Off-Center Path



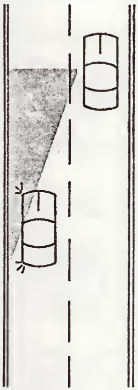
Driving an off-center path is caused by the driver's inability to judge the lateral position of the car in relation to the roadway—the driver thinks the car is in the center of the lane when it is not. Remember, the driver's position is in the left side of the vehicle, so position yourself slightly to the left of center of your path.

Learning Guide 10
Blind Spots

With an inside mirror only

Passing auto not visible.

With an outside mirror added



Passing auto is visible.

Question: What are the primary "blind spots" (areas outside the vehicle blocked from view from the inside)?

Answer: Right front, left front, right rear, left rear

Question: Which two of the "blind spots" are most dangerous?

Answer: Right and left rear

Pre/Post Assessment
Directional Control

1. The focal point for steering should be just to the right of the center line.
   _____True _____False

2. The directional control of a two-wheeled vehicle is related to rider balance.
   _____True ___False

3. Misalignment can create dragging friction on tires.
   _____True _____False

4. The weight, speed and vehicle profile influence directional control.
   _____True _____False

5. How the driver sits in the seat influences directional control.
   _____True _____False

6. Fixing the eyes on the intended path is good driving procedure.
   _____True _____False

7. Proper use of the rearview mirror will eliminate "blind spots."
   _____True _____False

8. When a car is in alignment:
   _____A. It allows the tires to roll parallel to each other.
   _____B. The rear tire will always follow the front tire.
   _____C. It means you have proper lane placement.
   _____D. The car will "hold the path" on any road surface.

9. Which of the following vehicles would be most susceptible to wind forces?
   _____A. A pickup with a camper.
   _____B. A semi-truck with empty trailer.
   _____C. A pickup without a camper.
   _____D. A mid-size automobile.

10. The major purpose of shock absorbers is:
    _____A To produce a smooth ride.
    _____B To allow tires to maintain continuous contact with the road.
    _____C To cut down on tire wear.
    _____D To prevent electric shock from battery.

11. "Blind spots" are:
    _____A. Areas around curves that cannot be seen.
    _____B. Areas where headlight beams do not cover.
    _____C. Areas outside the peripheral vision range.
    _____D. Areas of the driver's vision that are blocked out.

12. Malfunctions of the steering mechanism can be recognized by which of the following:
    _____A. "Shimmy."
    _____B. "Play" in the wheel.
    _____C. Pulling to one side.
    _____D. Any of the above.

Pre/Post Assessment Answers

Directional Control

1. False
2. True
3. True
4. True
5. True
6. False
7. False
8. A
9. B
10. B
11. D
12. D

Textbook References
Directional Control

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pp. 41, 259, 308 (1977)
pp. 20, 35, 59, 75, 95, 126, 176, 194, 303 (1982)

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pp. 62, 78-79, 107, 215, 283

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Safe Performance Driving.
pp. 72, 74, 77, 91, 93, 356, 358-359, 362, 365-366

Sportsmanlike Driving.
pp. 176-177, 185-186, 189, 197, 249

Tomorrow's Drivers.
pp. 35, 96, 136, 143, 155

Unit A: Basic Control Tasks

4.0 Speed Control

Principle: This concept will help the student to examine the people-machine-roadway interaction with regard to rate of movement, as a means of developing the capability to judge appropriate speeds for roadway conditions. Special emphasis will be given to speed control on turns and curves.

4.1 Source and Transmission of Power

Objectives/ Student Behavior: Given a diagram of the engine and power train, trace the power from its origin in the cylinders to the drive wheels describing the function of the clutch, transmission, drive shaft, transaxle and differential.

Learning Activities: Provide diagrams of the engine and the transmission for the students to study.

4.2 Acceleration

Objectives/ Student Behavior: Define "acceleration" and state the factors that determine the acceleration capability of vehicles.

Learning Activities: Discuss:

a. What is "fishtailing"?
b. What is a "wheelie"?
c. What is "peeling out"?
d. How do the above affect vehicle control?

4.3 Deceleration

Objectives/ Student Behavior: Define "deceleration" and describe non-braking techniques for safely and efficiently decelerating a moving vehicle.

4.4 Cornering

Objectives/ Student Behavior: Identify vehicle and environmental factors that determine speed selection on curves. The student will evaluate why certain vehicles (such as pickups, campers or trucks) can cause problems in cornering.

Learning Activities: Discuss:

a. Why are vehicles with higher centers of gravity more inclined to tip on curves?
b. How do rates of speed affect the turning capabilities of vehicles?

The student will analyze the effect turning has upon vehicles.

4.5 Speed Choice

Objectives/ Student Behavior:	Given a series of highway scenes to analyze (slides), identify roadway and vehicle conditions that indicate a need to evaluate and perhaps alter the rate of movement.

4.6 Speed Laws

Objectives/ Student Behavior:	Classify the various kinds of speed limits.
Learning Activities:	Discuss: a. Why is 55 mph the speed limit? b. What are the problem areas in town or on some roads?

Content

4.0 Power, available to the driver via the accelerator pedal, is made possible in internal combustion engines, by the interaction of the fuel and electric systems, assisted by the lubricating and cooling systems.*

4.1 A fuel pump draws gasoline (potential energy) from the storage tank and delivers it to the carburetor where it is atomized and mixed with air to form a combustible vapor.

A. From the carburetor the combustible vapor is drawn into a closed (except for intake and exhaust valves) cylinder with a close fitting piston, where fuel and electrical systems combine to convert heat energy of expanding gases into mechanical energy.
   1. Vapor is compressed in the cylinder by piston action and ignited by a spark plug which causes instantaneous burning. The resulting action thrusts the piston down. The downward thrust of the piston is converted into a rotary motion—a twisting force called torque—by the crankshaft attached to the piston.
   2. Most vehicles have four, six or eight cylinder-piston combinations, each exerting a downward thrust at a different instant. This arrangement provides a continuous and smooth power production.
   3. Four strokes of the piston represent a cycle repeated many times over which is the "heartbeat" of motoring (intake, compression, power and exhaust).

B. The twisting force of the crankshaft is transmitted to the drive wheels via:
   1. *clutch*—connects and disconnects the flow of power from the engine to the drive wheels;
   2. *transmission*—speed and power changing device;
   3. *driveshaft/transaxle*—transfers power from the transmission to the differential which transmits it to the drive wheels;
   4. *universal joints*—provide a flexible joint so that power can be delivered while the differential is bounding up and down from road shock (not found on front-drive vehicles); and
   5. *differential*—transmits the twisting force of the driveshaft to the axle shafts which are at right angles to it and allows the drive wheels to turn at different speeds in turning corners.

C. A supply of high voltage electricity is supplied to each spark plug in proper order and timing by the distributor, in cooperation with other components of the ignition system.
   1. The battery stores electricity, supplying current to start the engine and to operate the accessories.
   2. When the ignition and starter switch (usually combined) are turned on, electricity flows from the battery to a small electric starter motor which spins and cranks the engine.
   3. A generator or alternator, turned by the fan belt, provides current when the engine is running and keeps the battery charged. (A voltage regulator prevents overcharging and undercharging.) The ammeter light or needle indicates whether the current is flowing out or into the battery.

*It is recommended that the instructor take time to read and study other resource materials, possibly supplied by your vocational-technical instructor, that give background information on such things as the diesel engine, fuel injection, electronic ignitions, transaxles and the front-drive vehicle, computer assisted carburetion, etc. Because of the rapid advance in the area of vehicle technology, this section, *The Source and Transmission of Power,* will require constant updating and study on your part.

D. Lubricating and cooling systems are needed to keep the engine and power train functioning. In addition to the heat created by the burning of fuel, moving metal parts create friction which produces heat within the engine.
   1. Motor oil from the crankcase is pumped throughout the engine to: prevent metal to metal contact; collect contamination—exhaust gases and products that result from burned gasoline; and serve as a seal between cylinder and piston walls.
   2. Good oil does not wear out, but contamination can build up to dangerous proportions. Oil must be filtered and changed periodically.
   3. Some parts of the engine would quickly destroy themselves if much of the heat were not removed in a cycle of continuous cooling. The cooling function is performed by a continuous circulation of coolant being pumped around hot interior parts to absorb heat and then flowing down to the radiator where incoming air carries the heat away.
   4. A fan belt turns the fan which pulls an air stream through the radiator; it also turns the water pump which circulates the coolant through the system. A thermostat aids in maintaining a range of temperature conducive to efficient engine operation (an engine can run too cold).

4.2 Acceleration, the vehicle's capacity to increase from a given speed or stationary position to a higher speed, depends upon a variety of factors.

A. Engine power and gear ratio are dominant variables in determining acceleration capability.

B. Other factors influencing acceleration are:
   1. traction of the drive wheels;
   2. driver selection of proper gear ratio; and
   3. the driver's use of the accelerator pedal and related feedback.

C. To accelerate upgrade, the engine has to overcome the force of gravity in addition to the usual work of moving the car.

4.3 Deceleration, a decrease in the rate of speed of the vehicle, can take place through means other than braking.

A. When the pressure on the accelerator pedal is decreased, the car slows due to a retarding force of the engine compression, air resistance, and frictional forces between the tires and the road surface and in the moving parts of the engine and power train.

B. Downshifting (selecting a lower gear ratio in a manual transmission car), in combination with less pressure on the accelerator, produces a sufficient retarding force for control in some situations and also saves brake linings.

C. On a downgrade the driver can compensate for the pull of gravity by releasing the accelerator, braking, or shifting to a lower gear depending upon the degree of slope.

D. Taking your foot off the accelerator suddenly creates an effect that is similar to applying your brakes, a reality to be considered on slippery surfaces.

4.4 The tendency of a moving body to continue at the same speed and in the same direction (inertia) unless another force is applied confronts the vehicle operator as he strives to maintain directional control during turning movements.

A. On a curve, the turning of the front wheels is the force applied to change the direction of the vehicle (provides a side thrust).

B. In a curve, friction and the force of gravity combine to help keep your car from skidding off the roadway.

C. "Centrifugal" effect, a term of convenience to describe the effect of inertia when a car rounds a curve, varies at a geometric ratio—the square of the speed.
   1. Car speed is the most important variable in controlling a vehicle on a curve because of its dominant influence on centrifugal effect and is a factor over which the operator has direct control.
   2. As the radius of the turn is reduced, the centrifugal effect is increased and consequently the slower you will have to drive to get around it safely.
   3. Centrifugal effect increases directly with the weight of the vehicle; however, an increase in the coefficient of friction due to the added weight helps to balance this negative factor.

D. Besides the radius of the curve and the weight of the vehicle, other environmental, vehicular and operator factors determine the safe speed for curves.
   1. When a vehicle is cornering, the front wheels lead the rear wheels in such a manner that the tracks of the rear wheels are inside those left by the front wheels.
   2. The coefficient of friction between the tires and the road surface is the most significant factor in determining the safe speed on a curve.
   3. Whether the road is banked, flat or crowned makes a considerable difference in the safe speeds for negotiating a curve. (Crowned roads are banked the wrong way for a left hand turn.)
   4. Properly functioning shock absorbers increase cornering ability as they work with friction and gravity to combat centrifugal force.
   5. The dimensions and weight distribution of a vehicle have a lot to do with its cornering stability and the ease with which it can be handled on turns and curves.
   6. Proper tire pressure is important for optimum vehicle performance on a curve. Cornering ability tends to improve with the increase of pressure at a constant load because of the increase in sidewall stiffness.
   7. Oversteering on a turn generally results from accelerating too soon or failing to return the steering wheel to straight ahead soon enough.
   8. Braking the vehicle after entering the curve will tend to play into the hands of inertia and cause the vehicle to plow straight ahead on a tangent to the curve.
   9. If the driver enters a curve below the critical speed (speed at which frictional forces will break loose), he can accelerate coming out of the curve.
   10. In determining the safe speed for curves, engineers have considered vehicle and driver capabilities and also the physical forces involved.

4.5 Proper choice of speed is a major tool to be used in coping with highway hazards. As speed increases, the time available for identifying, predicting, deciding and executing decreases.

A. Objects and obstructions on or near the intended path of the vehicle (rocks, glass, barricades, fallen branches, curbs, poles, mailboxes, etc.) increase a hazard that drivers must reckon with by speed and/or direction adjustment.

B. Accurate speed adjustment is particularly critical on older roads built for cars of their day—frequently inappropriate for the characteristics of modern vehicles. Some examples are:
   1. numerous curves and hills;
   2. narrow lanes and bridges;
   3. low, narrow and soft shoulders;
   4. many near-roadway obstacles;
   5. changes in the number of lanes;
   6. poor or no markings; and
   7. deteriorating edges, chuckholes, etc.

C. Any speed can be excessive.

D. The small amount of time gained by increased speed (80 mph compared to 70 mph) does not justify the added risk.

E. A driver's sense of speed, not particularly keen at best, is distorted further under certain conditions (velocitization).
   1. The type of vehicle being driven affects the driver's sense of speed (height of eyes above the road; noise level; and vibration level).
   2. Cars seem to be moving faster when the windows are open.
   3. There is a tendency for sustained high speed driving to dull a driver's judgment of speed.
   4. Glancing frequently at the speedometer will help the driver to remain aware of the speed (particularly important on the freeway exit ramps and for a time after leaving the freeway).

4.6 Vehicle codes include more than one kind of speed limit.

A. Absolute speed limits, both maximum and minimum, serve as a guide to the driver in selecting appropriate speed for varying conditions.
   1. Persons drive in a variety of environments for the first time and, therefore, need some advice in respect to the selection of a reasonable speed.
   2. The underlying principle is that above or below certain limits speed in and of itself is dangerous and therefore illegal.
   3. Maximum speed limits vary with types of vehicles and with times and locations.
   4. A maximum speed limit does not give the operator permission to go that fast; it merely suggests the speed at which he may travel under ideal conditions.
   5. Speed limits are or should be determined by engineering studies which take into account natural laws.

B. In addition to absolute speed limits, drivers at all times operate under a basic speed law.
   1. This regulation compels the driver to use good judgment in scaling down the absolute speed limit to fit the conditions prevailing at a given time and place (reasonable and prudent speed).
   2. Although there is less chance that the driver will be cited for violating this speed law compared to the absolute, it is a more important law for him to self-enforce insofar as his and others' safety is concerned.

C. Some states include a prima facie speed law which combines features of both the absolute and the basic speed laws.

D. Data tends to show that greater heed is paid to speed advisory signs warning drivers of a hazardous situation than to regular speed limit signs.

E. Warning signs (diamond shape) are usually intended to help drivers perceive a hazardous situation—bring the information to drivers in advance of the point where they could see it, especially where visibility is limited.

Pre/Post Assessment
Speed Control

1. Power is the result of a small explosion of gas and air mixture in the cylinder.
_____True _____False

2. Velocitization is a term for a distorted sense of speed.
_____True _____False

3. Engine power is the sole determinant of acceleration capability.
_____True _____False

4. Drivers are more likely to pay attention to signs advising of hazardous situations than to regular speed limit signs.
_____True _____False

5. Which of the following will affect the ability of a vehicle to hold the road on a curve?
_____A. Tire pressure.
_____B. Shock absorbers.
_____C. Vehicle dimension and weight.
_____D. Any of the above.

6. Concerning centrifugal force and its effect on an automobile going around a curve, which of the following is true?
_____A. Centrifugal force decreases as the weight of the automobile increases.
_____B. Braking during the curve has no influence.
_____C. It causes drivers to oversteer.
_____D. As the radius of the turn is reduced, the centrifugal effect increases.

7. A force exerted on the vehicle to keep it going in the same direction, which also strives to push it off the road when the vehicle goes around a curve is known as:
_____A. Kinetic energy.
_____B. Centrifugal force.
_____C. Inertia.
_____D. Gravity.

8. When a vehicle is cornering, the rear wheels in relationship to the front wheels:
_____A. Follow in the same tracks.
_____B. Are to the inside of the front wheels.
_____C. Are to the outside of the front wheels.
_____D. Turn more slowly.

9. Which of the following is true in relationship to the maximum posted speed limit?
_____A. A driver can always go that fast without breaking any laws.
_____B. Vehicles must travel within 5 mph of the posted speed limit.
_____C. It is a suggested speed for ideal conditions.
_____D. Speed slower than that posted creates dangerous problems for other drivers.

10. The basic speed law implies:
_____A. The driver should use judgment and drive according to conditions.
_____B. Speed limits are determined by natural laws.
_____C. Speed is not to exceed 55 mph.
_____D. A 3 mph grace limit before the driver is in violation.

11. What systems prevent overheating?
_____A. Lubricating and exhaust systems.
_____B. Exhaust and cooling systems.
_____C. Lubricating and cooling systems.
_____D. Electrical and brake systems.

12. The posted speed limit means:
_____A. The fastest speed a driver is allowed to travel under all driving conditions.
_____B. The fastest speed a driver is allowed to travel under ideal conditions.
_____C. The fastest speed a driver is allowed to travel at night.
_____D. All of the above.

13. An experienced driver will determine his driving speed by:
_____A. Surface of the road.
_____B. Weather conditions.
_____C. Conditions of the vehicle.
_____D. All of the above.

14. The proper night speed should be determined by:
_____A. The posted speed limit.
_____B. Other traffic.
_____C. The distance your headlights reveal.
_____D. All of the above.

15. You are exceeding the speed limit on expressways in Montana at night if you are going:
_____A. Over 55 mph.
_____B. Over 60 mph.
_____C. Over 65 mph.
_____D. None of these.

Pre/Post Assessment Answers

Speed Control

1. True
2. True
3. False
4. True
5. D
6. D
7. C
8. B
9. C
10. A
11. C
12. B
13. D
14. D
15. A

Appropriate Instructional Materials

Speed Control

"Natural Laws in Driving," Filmstrip.
87 frames, 20 min., Bumpa-Tel.

"Driving Under Adverse Conditions," Filmstrip.
82 frames, 13 min., Bumpa-Tel.

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pp. 37, 40-46, 55-56, 71-72, 142, 145-146, 223, 264

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pp. 6, 9-13, 33-34, 35, 42-44, 65-81, 86, 108-109, 116, 149, 162, 167

In the Driver's Seat.
pp. 52, 81-82, 127, 129, 171, 201-202, 208-209, 222, 224, 299, 300

Learning to Drive: Skills, Concepts, and Strategies.
pp. 21, 39-40, 85, 104, 106-107, 188

Safe Performance Driving.
pp. 9, 18, 23-24, 34, 51, 57, 64, 99-105, 108, 130, 138, 189, 228-229, 234, 236, 246, 249, 251, 253, 259, 313, 326, 329, 331, 373, 403, 411, 427, 457-458

Sportsmanlike Driving.
pp. 15, 38, 112, 129-133, 168-169, 185, 195-199, 245-246, 311, 322.

Tomorrow's Drivers.
pp. 66-67, 119-122.

Unit A: Basic Control Tasks

5.0 Braking and Stopping

Principle: This concept will help the student examine the people-machine-roadway interaction with respect to braking and stopping a motor vehicle. In the process, students will acquire the skills basic to precise and well-timed braking.

5.1 Kinetic Energy

Objectives/ Student Behavior: Describe ways kinetic energy can be dissipated to stop a moving vehicle. Describe kinetic energy in relationship to vehicle movement.

Learning Activities: Discuss what happens to the kinetic energy of a moving vehicle. Discuss why a moving vehicle will eventually stop when on a level road. Include in the discussion rolling friction, friction of moving parts, air resistance, engine compression and gravity.

5.2 Normal Braking

Objectives/ Student Behavior: Indicate the factors that determine braking efficiency in a normal slowdown and stop. The student will perform a full stop without "jerking." The student will make smooth and effective stops from various pre-determined speeds. In making a complete stop, student will apply the brakes gradually and release slightly before full stop.

Learning Activities: Discuss how proper visual search will reduce the need for sudden and hard braking. Discuss the importance of applying brakes gradually and releasing them slighly before full stop.
Discussion questions:

a. If a vehicle is stopped rapidly, what happens to the passengers and objects inside the vehicle?
b. What effect does a steep downgrade have on braking?

5.3 Locked Wheel Stop

Objectives/ Student Behavior: Contrast locked wheel braking to normal braking with respect to man-machine-roadway factors. Describe the potential problems with locked wheel braking.

Learning Activities: Discuss why full, hard braking eliminates steering control. Discuss why sudden, hard braking indicates lack of I.P.D.E. Discuss what effect locked wheels have on steering and tires.

5.4 Braking Distance

Objectives/ Student Behavior:	Given certain speeds and coefficients of friction, predict the effect of these variables on braking distance.
Learning Activities:	Discuss what factors influence braking distance. Discuss why when you double the speed, the braking distance increases four times." (See Concept 3.0, Unit B, of this section for following other vehicles.)

5.5 Stopping Distance

Objectives/ Student Behavior:	Given certain speeds and times needed for identifying, predicting, deciding and executing, estimate the total stopping distances.
Learning Activities:	Have a group discussion emphasizing reaction time versus stopping distances and such possible distractions as daydreaming, visiting with passengers, radio, and sightseeing.

5.6 Braking Techniques

Objectives/ Student Behavior:	Relate principles underlying the braking operation to braking techniques.
Learning Activities:	Discuss why braking isn't always the safest reaction to emergency situations; how the parking brake can be effectively used in case of brake failure; why every car has brake lights; how braking techniques differ for wet pavement, dry pavement, ice, gravel, and dirt.

Content

5.0 When speed is constant, braking time and distance vary with the brake performance, tires, road surface, and braking technique of the driver.

5.1 A moving automobile, just as any other body in motion, possesses kinetic energy produced by its mass (weight) and its velocity.

A. Kinetic energy (momentum) keeps the car rolling after the foot is removed from the accelerator.

B. Kinetic energy increases in a geometric progression (as the square of the speed).

C. In a locked wheel stop, energy is dissipated through heat generated between the sliding tires and the road surface.

D. In a collision, energy is dissipated by crushing and bending the metal of the vehicle, or resistance from the obstacle that it hits.

5.2 Braking efficiency is influenced by a number of factors.

A. Wear, grease and water reduce the efficiency of the brake lining and drum contact points.

B. Liquids cannot be compressed; therefore, hydraulic fluid in brake lines running from a master cylinder to each wheel cylinder transmits pressure as effectively as a steel bar, assuming high quality brake fluid and a tight system.

C. If all four wheels are *not* braking equally, braking distance for a given speed will increase and steering will be unpredictable.

D. The front wheels are required to do more work than the rear wheels because of weight transfer.

E. Power brakes assist the driver in applying brake pressure but do not affect the amount of friction or braking force generated.

F. The coefficient of friction between the tires and the road surface governs the maximum braking force usable. The most powerful brakes are useless without traction.

G. Maximum braking force is obtained just before the wheels lock.

5.3 When brakes are applied too firmly or too suddenly the friction between the brake lining and the brake drum is so much greater than the friction between the tires and the road surface that the wheels stop or lock before the vehicle stops.

A. If the wheels lock, the friction between the tires and the road is the major determinant of the length of the stop.

B. The lower the coefficient of friction between the tires and the roadway, the less effort required to lock the wheels.

C. In a locked-wheel stop, heat generated between the tires and the road surface tends to melt tire rubber or ice, thus reducing further the coefficient of friction.

D. When the wheels are locked equally, the vehicle will usually slide straight ahead unless acted upon by some other force, i.e., the wind, side slope or crowned road, curve or surface variation.

E. When the rear wheels lock while the front wheels run freely, the vehicle will be prone to turn completely around (180°) if speed is sufficient. If not carefully controlled, applying the parking brake too forcefully in an emergency could produce the same result.

F. Locked-wheel braking in effect takes away your steering control.
   1. Rolling friction between tires and roadway is essential before the direction of the vehicle can be changed by the use of the steering mechanism.
   2. Although steering control is lost in a locked-wheel stop, braking distance may not be significantly different—in fact, it may be shorter.

5.4 Braking distance is the distance traveled from the time the brakes have been applied until the vehicle stops. This distance increases in a geometric progression. (Double the speed, and braking distance increases four times; triple the speed, and braking distance increases nine times.)

A. When speed remains constant, braking distance varies *inversely* with the coefficient of friction between the tires and the road surface. (When the coefficient of friction is reduced by ½, braking distance is doubled.)

B. A vehicle equipped with bald or threadbare tires will slide considerably farther on a *wet* surface than the same car equipped with tires having good tread. A driver can be lulled into a false sense of security because of the relatively good stopping ability of bald tires on a dry surface.

5.5 Total stopping distance equals the distance a vehicle travels during the time needed by the operator for identification, prediction, decision and execution, plus the time required for the brakes to stop the vehicle after the brake control has been activated.

A. Feet per second serve as a basis for determining distance traveled in a given time. To convert miles per hour to feet per second, multiply the miles per hour by 1.47.

B. Distance traveled in feet per second during these functions varies directly with the time. Distance equals time multiplied by velocity.

C. Identification, prediction and decision-making time vary widely with the complexity of the circumstances and the capability of the driver. They may vary from a fraction of a second when a red light suddenly appears to a few seconds in a highly discriminative type situation.

D. Execution time varies between individuals due to muscular coordination and skill; it also varies for the same individual at different times (fatigue, alcohol, drugs, etc.). Covering the brake pedal (foot poised on brake) when uncertain conditions lie ahead reduces execution time if braking becomes necessary.

5.6 Proper technique in braking can provide smooth stops, prevent accidents, and also add miles to the life of the brakes.

A. Braking technique becomes more critical as vehicle speed increases.

B. For efficient braking, foot pressure should conform with the speed so as to use minimum pressure to stop in required distance or time.

C. Releasing the brake pedal slightly just prior to stopping point permits the vehicle to level and prevents a "snap-back" effect.

D. A slight pumping action of the brake pedal serves to test the proper functioning of brakes, check the traction between the tires and the road surface, and provide a brake light warning to following traffic.

E. When compelled to stop quickly, particularly on a wet or icy surface, a steady "squeeze" of the brake pedal will minimize the danger of skidding, and steering control will be maintained. Wheel lock-up must be avoided.

F. When continuous braking is required for a period of time, such as on a long steep downgrade, shifting to a lower gear before starting down will provide engine braking power, take some of the strain off brake linings, and help to prevent brake fadeout.
   1. However, some automatic transmissions will *not* downshift above a certain speed.
   2. Light, smooth braking on a long downgrade is often preferred to "pumping," since the up-phase in pumping permits the vehicle to accelerate.

G. Although most of the basic concepts related to braking an automobile (friction, locked wheel braking and braking distance) also apply with slight modification to a two-wheeled vehicle, braking *technique* is different because of the different braking systems in two- and four-wheel vehicles.

Pre/Post Assessment

Braking and Stopping

1. A tankful of gasoline is an example of kinetic energy.
   _____True _____False

2. A vehicle traveling 20 mph will take twice the distance to stop as a vehicle traveling 10 mph, all else being equal.
   _____True _____False

3. The total stopping distance is the distance it takes to stop the vehicle after the braking mechanism has been activated.
   _____True _____False

4. Downshifting a vehicle is an example of a braking technique.
   _____True _____False

5. The maximum braking force is obtained just before the wheels lock.
   _____True _____False

6. Since bald tires touch more of the road surface, they tend to give a vehicle more traction.
   _____True _____False

7. When the rear wheels of a rear-wheel drive car lock, the action of the vehicle is which of the following?
   _____A. The vehicle is prone to turn completely around (180°).
   _____B. The vehicle is prone to skid in a straight line.
   _____C. The front end of the vehicle tends to lift off the road.
   _____D. The vehicle tends to pull clockwise.

8. Which of the following is true concerning power brakes?
   _____A. They help compress brake fluid and produce a hydraulic (increased strength) effect.
   _____B. They only work on the wheels that supply the power to the vehicle.
   _____C. Power brakes assist the driver in applying brake pressure.
   _____D. Power brakes keep the wheels from locking.

9. The major problem with locking the wheels when braking is:
   _____A. it wears the tires.
   _____B. it can do damage to the brake drums.
   _____C. it increases the total distance required to stop.
   _____D. it takes away your steering control.

10. Which of the following is true concerning kinetic energy?
    _____A. It can be changed to other types of energy.
    _____B. It cannot be destroyed but can change forms.
    _____C. It is related to the horsepower of a vehicle.
    _____D. It is eliminated when the key is turned off.

11. The proper braking technique when on ice or snow is:
_____A. Light, smooth braking.
_____B. Hard braking (so tires will dig into ice or snow).
_____C. Steady "squeeze" braking that gives maximum braking without lock-up.

12. Which of the following is **not** a symptom of brake failure?
_____A. Hard pressure on the brakes causes the wheels to lock.
_____B. Continuous hard pressure on the brake pedal causes the pedal to go slowly to the floor.
_____C. The car pulls to the right or left when the brake is applied.
_____D. The pedal goes within an inch or two of the floor.

13. Skidding caused by application of the brakes can occur:
_____A. on any surface, wet or dry.
_____B. only on wet surfaces.
_____C. only on icy and snowy surfaces.
_____D. only if the tires are smooth.

14. If the engine stops and your car has power brakes:
_____A. the operation of the foot brake is not affected.
_____B. you still have brakes but you must push harder.
_____C. you do not have any brakes.
_____D. the efficiency of the parking brakes and foot brake are affected.

15. What should be done as soon as a car straightens out from a skid?
_____A. The direction of the front wheels should be maintained.
_____B. The brakes should be applied.
_____C. The front wheels should be turned in the opposite direction and the brakes should be applied gradually.
_____D. The front wheels should be straightened to prevent skidding in the other direction.

16. When braking on a smooth surface, this type of vehicle will generally take a longer distance to stop:
_____A. Car
_____B. Motorcycle
_____C. Truck

17. Reaction time refers to which of the following?
_____A. How fast a person responds to a situation.
_____B. The time it takes a car to stop.
_____C. Distance it takes to stop a car.
_____D. All of the above.

Pre/Post Assessment Answers

Braking and Stopping

1. False
2. False
3. False
4. True
5. True
6. False
7. A
8. C
9. D
10. B
11. C
12. A
13. A
14. B
15. D
16. C
17. A

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pp. 43, 58, 194, 211, 215

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pp. 9, 25, 91, 147, 156, 158, 234-235, 249-250, 253, 274, 280-281, 283-285, 297-298, 306-307, 317, 321, 326, 370-372, 380-381

Sportsmanlike Driving.
pp. 18, 38, 85-87, 89-90, 199-200, 246, 250-251, 277, 322

Tomorrow's Drivers.
pp. 17, 32, 83, 92-96, 142-146

Unit A: Basic Control Tasks

6.0 Traffic Signs, Signals, and Pavement Markings

Principle: A great deal of information must be assimilated by the driver to drive efficiently and safely. Receiving good, accurate information is therefore vital to the driving task. Signs, signals, and pavement markings provide that important information as they help to regulate traffic, give warnings and provide guidance. As we drive, these signs, signals and pavement markings indicate direction, regulations, restrictions and potential hazards. They are very critical elements of the driving experience.

6.1 Purpose of Signs

Objectives/ Student Behavior: The student will be able to describe the purposes of signs and give examples of each.

Learning Activities: For observation time when in the car, have students identify signs for a 15-minute period. Keep a record of types, colors, shapes, etc. Complete Learning Guide 11.

6.2 Color of Signs

Objectives/ Student Behavior: The student will describe the colors used on signs and explain each.

Learning Activities: Discuss the significance of color on traffic signs.

6.3 Shape of Signs

Objectives/ Student Behavior: The student will identify traffic control signs by shape and interpret their purpose in relation to the driving task.

Learning Activities: Discuss why it is important to recognize signs by their shapes. Discuss the benefits of symbol signs.

6.4 Signals

Objectives/ Student Behavior: The student will be able to describe the placement of traffic signals and give advantages and disadvantages for each.

Learning Activities: Discussion Questions:

a. If you could change a traffic signal in your community, which one would you change and why?
b. What are the disadvantages of traffic signals?
c. How does signal placement affect the driver's perception of a signal?
d. If all traffic signals were removed, what would be the effect on traffic flow?
e. How might drivers benefit from uniform traffic control devices?

Study and complete Learning Guide 12.

6.5 Pavement Markings

Objectives/ Student Behavior: The student will define the various pavement markings and determine their effect upon the actions of drivers.

Learning Activities: Discussion Questions:

a. What are pavement markings used for on a highway?

Study and complete Learning Guide 13.

Content

6.0 Signs, signals and pavement markings provide information to drivers so they can drive safely and efficiently.

6.1 Signs can be classified into three groups—regulatory, warning and guide.

A. Regulatory signs tell a driver what can and cannot be done.
   1. Disregarding these signs may subject a driver to a fine.

B. Warning signs warn drivers of possible dangers, but do not have the force of law.

C. Guide signs help the driver stay on the correct route and designate services and other interesting information.

6.2 The color of a sign gives information relevant to its purpose.

A. Some regulatory signs have a red background with white lettering.
   1. Stop signs
   2. Yield signs
   3. Wrong way signs
   4. Do not enter signs

B. Other regulatory signs have a white background with red, red and black, black, green, or green and black lettering.
   1. No parking signs—red lettering
   2. No left turn signs—red and black lettering
   3. Speed limit signs—black lettering
   4. 2-hour parking signs—green lettering
   5. Parking signs—green or green and black lettering

C. Warning signs have either a yellow or orange background with black legend.
   1. Signal ahead sign—yellow background
   2. Road construction sign—orange background

D. Guide signs have backgrounds of green, blue or brown with white legend.
   1. Mileage signs—green background
   2. Service signs—blue background
   3. Recreation signs—brown background

6.3 Signs can be identified by their shapes. Drivers should be aware of sign shapes and drive accordingly.

A. Regulatory signs have various shapes.
   1. Octagon
   2. Triangle
   3. Rectangle
   4. Crossbuck

B. Warning signs can be identified by the following shapes:
   1. Diamond
   2. Pennant
   3. Round
   4. Pentagon
   5. Rectangle

C. Guide signs are various sizes and shapes.
   1. Rectangle
   2. Shield
   3. Trapezoid
   4. Square

6.4 Traffic signals include those for traffic control, pedestrian direction and lane-use signals.

A. Traffic control signal is the red, yellow and green set of lights found at intersections.
   1. A red light means the driver must stop.
   2. A steady yellow light warns the driver that a red light will follow.
   3. A flashing yellow light indicates to proceed with caution.
   4. A green light allows the driver to go ahead.
   5. Arrows within a light direct the driver to do as the arrow indicates.
   6. Traffic signals are found above the roadway or on the side of the road.

B. Pedestrian signals at intersections are for the purpose of controlling pedestrian traffic.
   1. Signals will flash "walk" or "don't walk."

C. Lane-use signals help to move cars over a roadway more efficiently.
   1. An arrow in the signal means the lane of traffic is open.
   2. A yellow X in the signal indicates the traffic lane will soon close.
   3. A red X in the signal indicates the lane is closed to traffic.

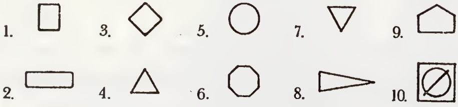
6.5 Pavement markings are designed to regulate, warn and guide drivers. Lines, arrows and lettering are printed on the road surface.

A. Center lines help to separate traffic.
   1. Broken yellow on a two-lane highway—passing permitted in either direction.
   2. Two yellow lines, one solid and one broken—passing permitted only for those with the broken line in their lane.
   3. Two solid yellow lines—passing is not permitted in either direction.
   4. Lane lines are broken white—used to separate lanes of traffic moving in the same direction, or as a single solid yellow or white line on the outside edge of the roadway.

B. Pavement markings can be found wherever pedestrians or drivers need to be given special directions. These markings can be in the form of words, symbols or lines.
   1. Some pavement markings accompany signs.
   2. Pedestrian crosswalks are lines painted across the roadway.

Learning Guide 11
Signs

Match the following signs with the appropriate term:



_____a Prohibited movement
_____b Guide, information
_____c Stop
_____d Regulate
_____e School
_____f Caution—slow moving vehicle
_____g Railroad
_____h Warn
_____i Yield
_____j No passing

Label the illustrated signs shown above for correct color.

Name of Sign	Color
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Learning Guide 12
Signals

Traffic Control | **Driver Reaction**

1. Flashing red signal light

2. Flashing yellow signal light

3. Traffic or pedestrian actuated signals

4. Placement of signals

5. Red signal light

6. Yellow signal light

7. Green signal light

Learning Guide 13
Pavement Markings

Pavement Markings	Driver Reaction
1. Marked crosswalk	
2. Unmarked crosswalk	
3. Traffic islands	
4. Solid white line on pavement edge	
5. Broken yellow lines in center of pavement	
6. Solid yellow line in your lane	
7. Double yellow lines in center of pavement	
8. Directional arrows	
9. Broken white lines	

Pre/Post Assessment

Traffic Signs, Signals and Pavement Markings

1. Road signs are always properly placed and maintained.
   _____True _____False

2. When a person willfully or neglectfully fails to heed signs, an accident is more likely to happen.
   _____True _____False

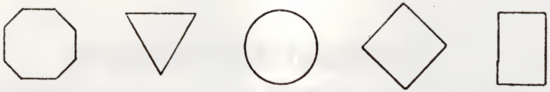
3. A flashing amber light means:
   _____A. Yield right of way.
   _____B. Stop.
   _____C. Caution and stay alert.
   _____D. School zone.

4. A solid yellow line on your side of the center line means:
   _____A. One-way traffic.
   _____B. Divided highway ends.
   _____C. Do not pass.
   _____D. Slow and proceed with caution.

5. What is the purpose of traffic signs?
   _____A. To govern speed and control traffic.
   _____B. To guide you as a driver.
   _____C. To help prevent accidents.
   _____D. All of these.

6. Pavement marked to permit passing is:
   _____A. A solid yellow line.
   _____B. A broken center line.
   _____C. A double line.

7. A traffic signal may be placed
   _____A. In the center above the intersection.
   _____B. On the corner of an intersection.
   _____C. Both of the above.



I II III IV V

8. Sign I is a:
______A. Railroad warning
______B. Warning sign
______C. Stop sign
______D. Yield sign

9. Sign II is a:
______A. Railroad warning
______B. Warning sign
______C. Stop sign
______D. Yield sign

10. Sign III is a:
______A. Railroad warning
______B. Warning sign
______C. Stop sign
______D. Yield sign

11. Sign IV is a:
______A. Railroad warning
______B. Warning sign
______C. Stop sign
______D. Yield sign

12. Which sign asks the driver to prepare for possible hazard ahead?
______A. Sign I
______B. Sign II
______C. Sign III
______D. Sign IV
______E. Sign V

13. Which sign asks the driver to begin slowing, scanning, and listening?
______A. Sign I
______B. Sign II
______C. Sign III
______D. Sign IV
______E. Sign V

Pre/Post Assessment Answers
Traffic Signs, Signals and Pavement Markings

1. False
2. True
3. C
4. C
5. D
6. B
7. C
8. C
9. D
10. A
11. B
12. D
13. C

Appropriate Instructional Materials

Traffic Signs, Signals and Pavement Markings

"Traffic Signs & Controls," Filmstrip. Bumpa-Tel, Inc., P.O. Box 611, Cape Girardeau, MO 63701.

"Uniform Traffic Control Devices," Part I Traffic Signs & Symbols, Safety Centers, Inc., 25 Reservoir Ave., Providence, RI 02907.

Montana Drivers Manual.

Montana Sign Index, Traffic Design Section, Department of Highways, Helena, MT 59620.

Traffico (a game), Traffico, Suite 1800, 51 East 42nd St., New York, NY 10017.

The New Look in Traffic Signs and Markings, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Manual on Uniform Traffic Control Devices, Superintendent of Documents, Stock No. 5001-0021. Same address as above.

Textbook References

Drive Right.
pp. 16-28 (1977)
pp. 34-51 (1982)

Driver Education and Traffic Safety.
pp. 195-201, 246

Driving: A Task Analysis Approach.
pp. 23-36

In the Driver's Seat.
pp. 53-57, 203

Learning to Drive: Skills, Concepts, and Strategies.
pp. 89-90, 184-186

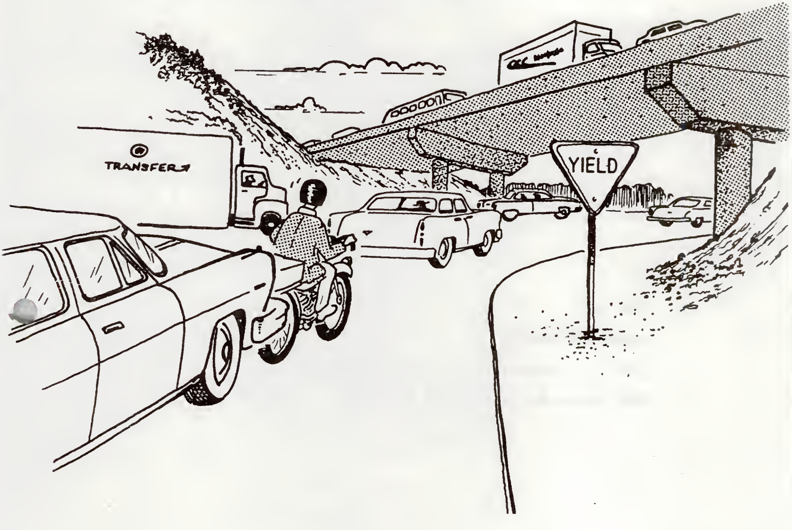
Safe Performance Driving.
pp. 53-66

Sportsmanlike Driving.
pp. 24-25, 100-102, 127, 136-149

Tomorrow's Drivers.
pp. 51-61.

Unit B:

Interacting with Other Highway Users



Unit B:

Interacting with Other Highway Users

Concepts:

1.0	Visual Impairments
2.0	Distractions
3.0	Movement Within the Traffic Flow
4.0	Intersections
5.0	Pedestrians and Animals
6.0	Driving Variations

Content

Learning Guides

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit B: Interacting with Other Highway Users

1.0 Visual Impairments

Principle: Visual perception plays a major role in successful driving performance. Visual limitations and impediments (interferences) are the most severe handicaps a driver can have. Awareness of the important role vision plays will allow the driver to compensate for limitations.

1.1 Structure and Function

Objectives/ Student Behavior: Students will be able to explain the structure and function of the four basic parts of the eye. Students will identify the various functions the eye performs and select methods to compensate for any deficiencies.

Learning Activities: Study Learning Guide 14. With the use of diagrams, slides and charts, illustrate how the eye functions during daylight hours and at night. Explain how basic eye problems affect driving, and methods of compensation for: visual acuity, depth perception, field of vision, night vision, color perception. Study Learning Guide 15.

1.2 Clean Windshield and Windows

Objectives/ Student Behavior: Group the impediments to vision caused by dirty or foggy car windows and describe measures under the driver's control to prevent or compensate for these conditions. Before driving, each student will clean the windshield and be sure windows are clean.

Learning Activities: Discuss the problems created by a dirty windshield and dirty windows. Demonstrate how to properly clean a windshield. Discuss why dirty windshields are worse at night. Keep a supply of soft cleaning papers and cleaning solution in the automobile.

1.3 Visual Obstruction

Objectives/ Student Behavior: Given a series of traffic situations (slides or diagrams), "spot" the obstruction and select appropriate measures to compensate for the situation.

Learning Activities: Complete Learning Guides 16 and 17. Discuss why things hung from the rear-view mirror or speakers and other items placed in the rear window can reduce visibility.

1.4 Climatic Conditions

Objectives/ Student Behavior:	Illustrate the similarity of various climatic conditions and darkness with respect to vision problems. Have student orally explain the best way to obtain maximum visibility in natural elements.
Learning Activities:	Discuss the visual problems created by natural elements and the mechanical equipment available to overcome them (include snow, fog, dust, darkness and rain).

1.5 Driving at Night

Objectives/ Student Behavior:	Classify the visual handicaps imposed by darkness and describe compensatory measures at the operator's disposal. Students will describe searching beyond your headlights and driving beyond your visibility.
Learning Activities:	Discuss why it is a good Idea to turn on your low-beam headlights during a storm or even dark, cloudy weather. Discuss why you look to the right of the headlights at night with respect to oncoming cars. Simulate recovery from glare by flashing a strobe light in a darkened room.

Content

1.0 Although impediments to vision handicap the operator under any circumstances, they are especially hazardous where there is interaction with other highway users.

1.1 Good vision is the most important of the senses used in driving and cannot be compensated for by any amount of improvement in the other senses.

A. A certain standard of visual ability is necessary before a drivers license can be issued.

1. An eye test must be taken when a license is renewed.
2. A drivers license will indicate what visual aids a driver must have, for example, must wear glasses; cannot drive at night.

B. The eye functions much like a camera. It produces images by sending an electrical impulse to the brain through the optic nerve.

1. The lens has the same function as a camera lens; it helps bring together or spread light rays to form images.
2. The iris is a type of shutter, which regulates light. It enlarges at night to let in more light.
3. The cornea is a clear covering over the eyeball.
4. The optic nerve is like the film; images are implanted on this structure.

C. The eye has several functions to perform for driving.

D. Visual acuity is the driver's ability to see details. The ability to distinguish between a moving object and a stationary one at a long distance is good visual acuity.

E. Depth perception is the ability to judge distances. This ability is obviously important in overtaking and meeting vehicles, following other vehicles and judging an adequate stopping distance.

F. Field of vision is the area in which a person can detect objects. For humans, the clearest vision is directly in front. But some movement can actually be detected well beyond 180°.

G. Night vision implies there is less light. Certain structures called rods collect light. Some people have less of these than others. Night vision deteriorates with age.

1.2 If a driver fails to maintain clean windshields and car windows, both inside and outside, the ability to identify relevant cues in the traffic scene is limited.

A. A clean windshield is important any time, but critical at night.

1. With a clean windshield approaching lights are easier to face. Dirt and road film diffuse approaching headlights.
2. A bug which is only a speck by day becomes a glaring spot at night.
3. When the windshield is dirty, so are the headlights.

B. Windshield wipers and washers help to maintain good forward visibility in spite of weather conditions.

1. If windshield wipers begin to "streak," they may be covered with road film, so clean the blades with water and detergent.
2. If they continue to streak, the rubber blade has probably deteriorated and should be replaced.
3. If new blades fail to improve the situation, have tension or pressure of the blade checked.
4. Wipers should be stopped when rain or snow stops to avoid scratches which eventually reduce the transparency of the glass. This can also occur from using a dry cloth to clean dirty windshields.
5. Keep the windshield washer in good repair and filled with water and windshield cleaner. (Helps remove dirt and bugs from the glass and in winter protects the washer parts from freezing.)

C. Inside surfaces of windows may fog—winter or summer.
   1. Use defroster rather than cloth or tissue.
   2. Blower air needs to be heated in winter.
   3. Sudden fogging or icing may require the driver to get off the roadway as quickly and safely as possible.

D. Visibility to the sides and rear of the vehicle enables the driver to detect cues helpful in selecting a safe path and speed.
   1. Failure to remove snow, ice or frost from not only the windshield, but all windows, is *negligence.*
   2. Cigarette smoke and dust cling to the inside glass and gradually reduce vision with deceptive slowness.

1.3 View obstructions are "occupational hazards" in driving, but the unnecessary ones should be eliminated and the others adjusted for by the vehicle operator.

A. The size of a view obstruction caused by vehicle design, a sticker on the car window, or an item within the vehicle is enlarged many times over at a distance from the vehicle. (To illustrate, hold your hand at arm's length and notice the size of the area blocked out at 100 feet.)

B. Operators can reduce the view obstruction hazard caused by parked and moving vehicles by adjusting their space relationship to the other vehicles.
   1. Trucks are a problem because you cannot see through them to identify other traffic.
   2. In rain, trucks throw a spray of water that interferes with vision in a passing maneuver.

C. Operators can reduce the problem of barriers to sight such as a building, a blind corner, or a parked car, by expecting potential hazards behind the barriers. (Unfortunately for some operators, potential hazards do not have the potency of visible hazards and they play Russian Roulette.)

D. In addition to interfering with the driver's movements, a passenger sitting in the front middle seat may obscure the driver's vision to the rear through the rearview mirror or obstruct the driver's check of the blind spot on his right. (Better to sit three in back than three in front.)

E. One of the most practical and least costly measures to improve the operator's visibility is to eliminate signs, bushes, trees, poles and cars parked near intersections.

1.4 Weather conditions may reduce visibility. This may add the limitations of night driving to a daytime situation or compound the normal visibility problems associated with nighttime driving.

A. Rain, particularly at night, can distort vision. The wet surfaces reflect all the lights, creating a maze for you to drive through.

B. Aside from helping oncoming operators to see you, switching your lights on in a heavy rain also helps the driver directly ahead whose back window is rain splattered. An unlighted vehicle is difficult to detect in a mirror during a heavy daytime rain.

C. Low beam headlights are more effective in fog (rain and snow also) because fog is made up of tiny particles of water that act like mirrors to reflect high beam lights. In light fog, high beams may show more of the roadway in spite of the glare.

D. The face shield used by the two-wheeled vehicle operator will impede vision when wet, and it will fog up in cool weather when the vehicle is not in motion.

E. In fog, heavy rain or snow, and other times when visibility is extremely poor, drive slowly, hug the side of the road, and glance frequently at the edge of the road to keep your bearings.

F. The sun can be a particular hazard because the eye adapts slowly to changes in light intensity.
   1. When facing the blinding effects of the sun (early morning or late afternoon), drivers can improve their vision by: keeping the windshield clean; properly positioning the sun visor(s); and wearing sunglasses.
   2. If you are driving away from the sun, do not assume that oncoming operators can see you; they may be blinded by the sun. (Turn on your headlights.)
   3. After hours of driving in the bright sunlight, your visual efficiency is reduced at dusk and in darkness.

1.5 Due primarily to reduced visibility, critical phases of the operator's task are more difficult under night-time driving conditions. The competent operator adjusts for these differences.

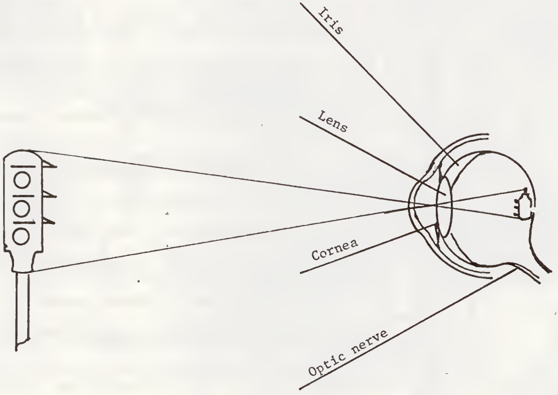
A. The flood of detail available to help the operator during the daytime is reduced appreciably at night.
   1. Aside from reducing detail, darkness conceals hazards (the pedestrian, the two-wheeled vehicle, the stalled car, the curve and other objects or conditions). Therefore, the operator makes a decision on the basis of a sketchy and incomplete picture.
   2. It is more difficult to judge the speed and position of another vehicle at night.
   3. Operators must depend largely on their headlights, which illuminate only a relatively short and narrow path ahead and do not bend around corners.
   4. The amount of adequate highway lighting is limited.
   5. Glare from roadside lighting and the headlights of oncoming vehicles impair visibility.

B. To compensate for the handicaps imposed by darkness:
   1. Keep panel lights dim for better vision, but always have enough panel light to read the speedometer.
   2. Reduce stopping distance by slowing down, so that you can stop within the visible distance.
   3. Increase sight distance by keeping the windshield clean and the headlights clean and properly aimed.
   4. Watch beyond the headlights on or near the roadway for slow moving or unlighted vehicles, curves and T intersections, road obstructions or defects, trains, pedestrians and animals.
   5. Avoid looking directly into glaring headlights of oncoming vehicles.
   6. Increase your following distance.
   7. Allow a greater margin of safety when overtaking and passing.
   8. Be especially careful to observe and fully obey all rules of the road and all traffic signs and signals.
   9. Do not wear sunglasses or tinted face shields (motorcycle operators) at night.
   10. Keep face shield clean and free from scratches which will increase glare at night.

C. When visibility is reduced by darkness or weather conditions, other operators are similarly hampered.
   1. Clear and timely signalling of your intention to slow, stop or turn is more important than ever at night.
   2. Be sure that taillights, back-up lights, license plate lights, and turn signals are functioning.
   3. Turn your low-beam headlights on at dusk and during daytime periods of low visibility; not that you will see much better, but other operators will be able to see you (particularly important for two-wheeled vehicle operators).
   4. Use low-beam headlights when an oncoming vehicle is approaching, when following, or when passing, regardless of what the other driver does. A quick flash of high beam may be used to indicate a pass.
   5. If for some reason you must stop along the highway, pull well off the traveled portion and actuate a 4-way flasher.

Learning Guide 14

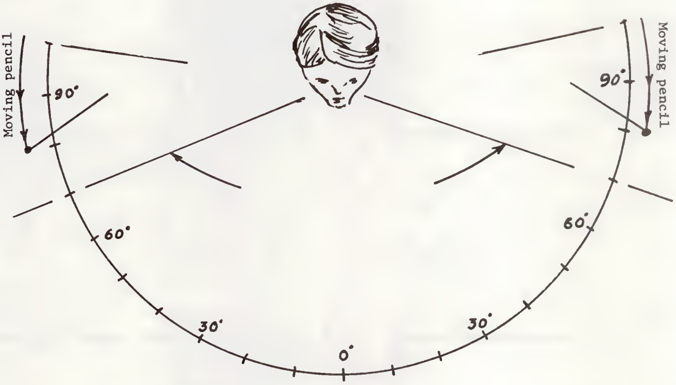
Parts of the Eye



Learning Guide 15

Peripheral Vision

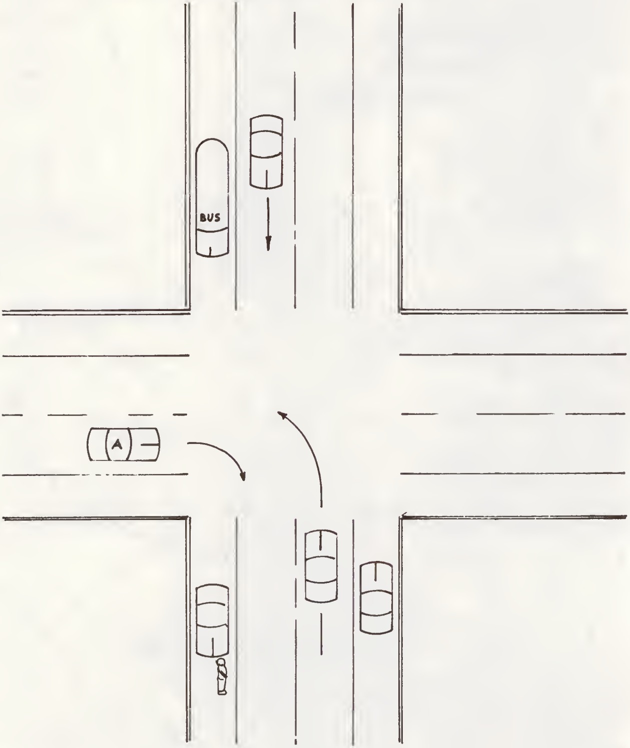
You can make this field-of-vision testing device.



Minimum safe field of vision 140°.

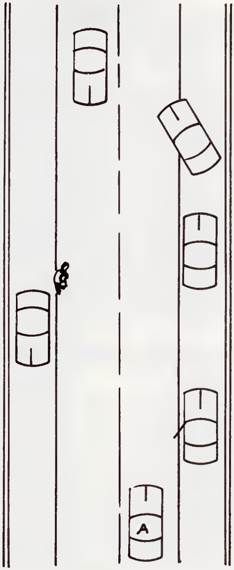
Learning Guide 16
Perceptual Skills

List the visual problems which face the driver of Car A.



Learning Guide 17

Hazard Recognition



As the driver of car A, what hazards do you see?

Pre/Post Assessment

Visual Impairments

1. Color perception is not an important factor for night driving.
   _____True _____False

2. A windshield will often stay cleaner of fog for a longer period of time if wiped with a cloth, rather than using the defroster.
   _____True _____False

3. It makes good driving sense to expect problems around a blind corner and to drive accordingly.
   _____True _____False

4. A passenger might impair the vision of the driver when sitting in the front middle seat.
   _____True _____False

5. High beam headlights are better able to penetrate a heavy fog.
   _____True _____False

6. Night driving is actually safer because the darkness eliminates many driver distractions.
   _____True _____False

7. Rain reflecting light at night is noted for its ability to distort vision.
   _____True _____False

8. The ability to distinguish which of two distant objects is closer is known as:
   _____A. Depth perception.
   _____B. Field of vision.
   _____C. Visual acuity.
   _____D. Visual perception.

9. The ability to see to the side without turning the head is known as:
   _____A. Side vision.
   _____B. Peripheral vision.
   _____C. Visual acuity.
   _____D. Depth perception.

10. Windshield wipers that "streak":
    _____A. May have road film on them.
    _____B. May have rubber that is deteriorated.
    _____C. May not have enough tension pressure on them.
    _____D. Any of the above may be true.

11. When the approaching vehicle fails to dim, you should:
   ______A. Switch from low to high beam and back to low again.
   ______B. Switch from low to high beam and leave them on high.
   ______C. Switch lights off, then back on again.
   ______D. Slow down, look to the right edge of roadway.

12. Which of the following is true concerning night driving?
   ______A. Inside panel lights should be turned completely off.
   ______B. The two-second rule for following still holds.
   ______C. It is easy to drive beyond your headlights.
   ______D. Sunglasses will improve your ability to see because they will cut glare.

13. Limited vision in the city is created by:
   ______A. Huge trucks.
   ______B. Tall buildings.
   ______C. Other cars.
   ______D. All of these.

14. What should one do while driving down the road?
   ______A. Aim visual search so as to see what is going on at least a block ahead of the car.
   ______B. Try to determine what is going to happen ahead of time.
   ______C. Try to avoid conflicts.
   ______D. All of the above.

15. Good visual perception consists of:
   ______A. Depth perception.
   ______B. Color acuity.
   ______C. Peripheral vision.
   ______D. All of the above.

16. Skilled drivers use their eyes in which of the following ways?
   ______A. Focuses attention directly ahead of the car.
   ______B. Focuses attention directly on the car ahead.
   ______C. Continually looks from side to side as well as straight ahead.
   ______D. All of the above.

17. Which of the five basic senses gives drivers most of their driving information?
   ______A. Ears
   ______B. Nose
   ______C. Touch
   ______D. None of the above.

Pre/Post Assessment Answers

Visual Impairments

1. False
2. False
3. True
4. True
5. False
6. False
7. True
8. A
9. B
10. D
11. D
12. C
13. D
14. D
15. D
16. D
17. D

Appropriate Instructional Materials
Visual Impairments

Film: "Smith System," Ford Motor Company, The American Road, Dearborn, MI 48121.

Psychophysical Testing Equipment, Montana Automobile Association, 607 N. Lamborn Helena, MT 59601 or Bumpa Tel, P.O. Drawer O, Cape Girardeau, MO 63701.

Filmstrip: "Test Your See Power," National Safety Council, 444 N. Michigan Ave., Chicago, IL 60611.

"Facts About Vision and Highway Safety," American Optometric Association, 4030 Choteau Avenue, St. Louis, MO 63110.

"Visual Perception and the Driving Task," American Driver and Traffic Safety Education Association, 123 N. Pitt St., Suite 500, Alexandria, VA 22314.

Textbook References

Drive Right.
pp. 41, 65, 219-223, 228, 256-259 (1977)
pp. 150, 199, 208-209, 227, 244-247, 269 (1982)

Driver Education and Traffic Safety.
pp. 135-136, 208-211, 224, 274, 315

Driving: A Task Analysis Approach.
pp. 61, 104-108, 114-115, 117, 215

Driving With Car Control.
pp. 23-24, 40-41, 163-166, 199, 201

In the Driver's Seat.
pp. 14-17, 45, 83-84, 105, 112, 146, 149, 236

Learning to Drive: Skills, Concepts, and Strategies.
pp. 27, 29, 97-98, 200-209, 215, 217

Safe Peformance Driving.
pp. 69, 71, 105, 132, 161-176, 182, 197, 201-202, 217-220, 244, 252, 258-261, 269, 342, 356, 365, 378-379, 391, 396, 422

Sportsmanlike Driving.
pp. 21-23, 159-164, 289-291

Tomorrow's Drivers.
pp. 79-80, 136-138, 154-155

Unit B: Interacting with Other Highway Users

2.0 Distractions

Principle: Distractions appear to be another common and serious threat to successful performance of operator task requirements. The driving environment, both inside and outside the vehicle, is full of distracting influences which drivers must ignore or adjust to. This concept aims at helping students identify these distracting influences and develop mental habits to prevent them from interfering with effective driving performance.

2.1 Environmental Distractions

Objectives/ Student Behavior: Classify potentially distracting environmental factors, predict the possible consequences, and formulate compensatory measures. List a solution for each distraction.

Learning Activities: Have students list all the distractions outside the vehicle, including those caused by surroundings and environment. Guide students in formulating solutions to these problems.

2.2 Within-Vehicle Distractions

Objectives/ Student Behavior: Classify potentially distracting within-vehicle (non-passenger) distractions and suggest personal means for reducing or eliminating the hazard created by these conditions. Describe the ways in which a passenger can be either an asset or a liability to the operator. Have students compile a list of activities which would be "good passenger" behavior.

Learning Activities: Have students list all the distractions from within the vehicle, including those caused by passengers, physical surroundings, and environment. Guide students in formulating solutions to these problems. Complete Learning Guide 18.

Content

2.0 The ability to sustain vigilant attention over long periods of time is a human limitation for which operators must compensate.

2.1 Environmental and vehicular factors can encourage operators to disassociate themselves (mentally) from the driving task.

A. Although modern highways and vehicles have been engineered and built to provide safety and comfort, the very nature of this combination can lull you into an inattentive state of mind.
   1. Highway designers are cognizant of this reality and are building more stimuli and variation into highways.
   2. Long-haul driving may induce lack of awareness (a dull drowsiness) by the drone of the engine, the hum of the tires, an absence of scenic distraction, a fixed eye position and a lack of physical mobility.

B. Frequently, where the need for attention by the operator is most urgent, the distractions outside the vehicle are the most numerous. In cities particularly, operators must disregard a barrage of distractions, many deliberately designed to attract attention.

C. The danger of inattention in driving can be minimized by:
   1. Realizing when and where gaps in attention and distractions are most likely to occur, and developing mental habits and discipline that reduce the number and duration of these gaps;
   2. Developing good operational habits to "carry" us through the lapses.

2.2 There are numerous distractions within the vehicle. Some of these distractions are part of the normal driving experience.

A. Be sure that doors, seats, mirrors, windows and seat belts are properly secured and adjusted before moving the vehicle.

B. In case you have an operational problem while underway (door unlatched, outside mirror adjustment, bee in vehicle), it is safer to get off the highway and correct the problem.

C. Avoid reaching for papers, books, purses, bottles, etc., that have fallen on the floor until you have stopped the car.

D. Learn to adjust the heater, air conditioner, radio, windshield wipers, inside rearview mirror, and front window (driver's side) without taking your eyes off the road or, if you do, use brief glances.

E. Passengers can help the driver by handling non-operational tasks, such as temperature control, radio adjustment, child control and other activities that might distract the driver.

F. Passengers should refrain from irrelevant (to the driving task) conversation at the times when the driver needs the full capability of perception and decision making. As a driver, if you talk to passengers, it should be without looking at them.

Learning Guide 18

Driving Distractions

Do You Know Your Dashboard?

Fill in the dashboard distractions that could cause you trouble on the highway or busy city streets.

List five prime distractions which occur within the car.

1.
2.
3.
4.
5.

List five prime distractions which occur outside the car.

1.
2.
3.
4.
5.

Pre/Post Assessment

Distractions

1. Some aspects of driving may in and of themselves be a distraction to the driving task.
   _____True _____False

2. Some structures (signs, etc.) are actually meant to distract the driver.
   _____True _____False

3. Passengers can be either an asset or a liability to the driver.
   _____True _____False

4. If you are driving and you need to make an adjustment to the outside mirror, which of the following should be your action?
   _____A Do so while the car is in motion, but be careful.
   _____B If possible, pull off the road and correct the problem.
   _____C Wait until you reach your destination to adjust the mirror.
   _____D None of the above.

5. You are driving alone and a bee flies in the window. You react by:
   _____A Trying to swat it if it comes near you.
   _____B Turn up the radio ("Music soothes the savage beast.")
   _____C Roll down your window so the draft can suck it out.
   _____D None of the above.

Pre/Post Assessment Answers

Distractions

1. True
2. True
3. True
4. B
5. D

Textbook References

Drive Right.
pp. 274-279 (1977)
pp. 256-259 (1982)

Driving: A Task Analysis Approach.
pp. 121-122

In The Driver's Seat.
pp. 150-151

Unit B: Interacting with Other Highway Users

3.0 Movement Within Traffic Flow

Principle: This concept relates the human functions involved in operating a motor vehicle to specific "fore and aft" relationships with other highway users. Emphasis will be placed on strategy to avoid conflict or turbulence within the traffic flow, but evasive actions will also be learned.

3.1 Following Other Vehicles

Objectives/ Student Behavior: Students will describe the "time interval" following distance rule to maintain a space cushion. Students will describe how to reduce following conflicts from clues such as: signal lights, slow-moving vehicles, turning vehicles, lane "jumpers," and pedestrians.

Learning Activities: Study and discuss Learning Guide 19. Discuss and clarify following procedures utilizing Learning Guide 20. Discuss reaction time, reaction distance, braking distance, total stopping distance, tailgating (see Braking and Stopping Distance, Concept 5.0, Unit A, of this section).

3.2 Being Followed by Another Vehicle

Objectives/ Student Behavior: Student will identify the conditions of a proper space cushion to the rear and evaluate factors which might cause rear-end collisions. Student will describe situations where communication should be transmitted to following vehicles and the methods to be used. Student will identify impending dangers associated with various types of roads which might lead to following conflicts. Student will adjust position through speed and steering to maintain a space cushion front and rear. Student will warn following driver by use of brake lights, signals and position. Student will maintain visual search patterns fore and aft.

Learning Activities: Discuss the following:

a. Maintaining space cushion to the front and rear is a necessity.
b. Common problems related to being followed and solutions to avoid such conflicts.
c. Coordination of visual search to the front and rear. Beginning driver has a tendency to focus attention in only one direction.
d. Warning driver of diminishing space cushion. Sudden driver action, such as braking, requires drastic action on part of other drivers.
e. Importance of making your intentions known.
f. Importance of constant mirror checks and leaving an escape route.

Study Learning Guide 21.

3.3 Meeting an Oncoming Vehicle

Objectives/ Student Behavior: Students will be able to describe the potential problems of meeting an oncoming vehicle and to state what causes the problems.

Learning Activities: Discuss why you always leave yourself an "out" and evasive maneuvers in the event an oncoming vehicle pulls into your lane.

3.4 Passing and Being Passed

Objectives/ Student Behavior: Describe the correct step-by-step process for passing another vehicle going in the same direction. Description should include the rationale for each step. Student will compare passing and lane changing and will identify the similarities and differences and explain why it is more dangerous to pass than to make a lane change. The student will be able to identify no-passing zones and situations. During the driving experience, the student will correctly perform the passing procedure.

Learning Activities: Discuss: when it is necessary to pass; when you shouldn't pass; the risk of head-on collision; the danger of not having a way out; the distance required to pass; areas of passing and no passing; effects of various size vehicles on passing. Study Learning Guides 22, 23 and 24.

3.5 Lane Changing

Objectives/ Student Behavior: Students will identify driving conditions which will necessitate a lane change. Students will explain lane-changing procedures. Students will identify the possible conflicts associated with various types of vehicles in lane changing. Students will perform proper lane-changing procedures under varying traffic conditions.

Learning Activities: Discuss and clarify lane-changing procedures. Have class discuss when a lane change should occur. Stress importance of visual check, signal, blind spots, proper degree of turn, and final car position. Study and complete Learning Guides 25 and 26.

3.6 Turnabout

Objectives/ Student Behavior: Student will define and explain how to complete U-turns, two-point turns and Y-turns or three-point turns. The student will define the possible conflicts which might occur when performing each type of turnabout. Student will execute each type of turnabout.

Learning Activities: Discuss and clarify turnabout procedures for U-turns, two-point turns, and Y-turns. Identify the possible conflicts associated with various turnabouts. Identify the regulations regarding turnabouts for the city and state. Study and complete Learning Guides 27-31.

3.7 Parking

Objectives/ Student Behavior: The student will describe how to angle park and will be able to identify the potential problems. The student will list the procedures for the various types of parking. The student will be able to name the important points of parallel parking and explain why each is important. The student will be able to explain how to park uphill and downhill with and without curbs. The student will be able to successfully complete the various types of parking.

Learning Activities: Clarify and discuss parking procedures for angle parking, parallel parking, and parking on a hill. Discuss potential problems when using the various methods to park. Study Learning Guides 32-36. (See Keys to Parallel Parking, Appendix A.)

Content

3.0 Except at intersections and merging locations, the operator's sub-tasks of interacting with other highway users relate mostly to vehicles in front and in back of the vehicle.

3.1 To be prepared for unexpected moves by the vehicle(s) in front of you, maintain proper following distance and watch for conditions which would cause the driver to slow or stop.

A. So that you can adjust for fluctuations in the speed of traffic ahead without sharp braking or acceleration, allow your reaction time distance plus a generous margin of safety.
   1. Your braking distance may exceed the braking distance of the vehicle in front.
   2. If the preceding vehicle hits something, it may stop far short of the braking distance.
   3. Lightweight motorbikes may be stopped in a shorter distance than an automobile below 25-30 mph, so increase following distance. In addition, motorbikes and motorcycles can topple during an emergency stop or from striking an object on the roadway.

B. It is wise to allow a much wider margin of safety when you are traveling at high speed, at night and on slippery surfaces.
   1. On freeways there is virtually no such thing as a "minor" rear-end collision.
   2. Braking distance is more unpredictable on slippery surfaces.
   3. It is more difficult at night to detect conditions ahead which could cause preceding vehicles to reduce speed suddenly.

C. By driving too close to the vehicle in front:
   1. You must work harder to keep your vehicle in its lane, because you are tracking on the vehicle ahead rather than on a point down the road.
   2. Your speed control will be erratic as you try to judge and adjust your distance behind the vehicle ahead.
   3. Your view of conditions ahead and to the sides (escape route) is limited.

D. When you maintain a proper following distance, you will occasionally encounter the annoying problem of the "compulsive gap-filler."
   1. Simply drop back and re-open a space for your own protection.
   2. You cannot cure the intruder by an emotional outburst or by competing with him.
   3. Actually, you will lose little time even though this experience happens a number of times on a given trip.
   4. You can help to preserve a safe gap ahead of your vehicle by making sure that, while adequate, it is not too big or inviting—especially in heavy traffic.

E. By being alert and anticipating slow-downs or stops ahead, you will rarely need to use all of your space cushion or resort to a screeching, lurching "panic stop." Some warning clues are:
   1. A traffic light that was green for a long time ("stale green").
   2. A vehicle preparing to turn.
   3. A driver trying to force his way into another lane.
   4. Children playing near the road.
   5. A person getting out of a parked car on the street side.
   6. A street repair job that's causing a bottleneck.

F. At higher speeds there is a tendency to underestimate the rate of closure between your vehicle and the preceding vehicle (particularly dangerous in the case of a farm vehicle ahead).

G. During freeway driving, be prepared to adjust your speed and lane position to assist other vehicles as they enter and leave the freeway. If there are many entrances and exits, it may be better to drive in the second lane from the right.

H. By placing your headlights on low beam, you will avoid blinding the driver of the preceding vehicle with your headlights at night (a law in some states).

I. If you are driving a motorbike, position your vehicle so that the driver in front can see you in his rearview mirror.

3.2 To some extent you are at the mercy of the driver following you, but there are some measures under your control which can reduce the probability of conflict.

A. Dispose of the "tailgater" by accelerating, decelerating, or moving into a slower lane. (Let him pass!)

B. Be alert to conditions ahead so you can avoid sudden or needless stops.

C. Flash your stop lights by "pumping" the brake pedal and also use a vigorous arm signal to warn an overtaking operator who seems unaware that you are slowing down.

D. When turning off a road, do it as quickly as circumstances permit—especially on left turns.

E. Be sure that taillights, stop lights and turn signals are working properly.

F. Avoid slowing or stopping not required by traffic conditions—to admire scenery or to check a street address.
   1. An operator doing 35 mph in a stream of vehicles moving at 60 mph, *relatively* is driving at 25 mph directly against the flow of traffic in his own lane.
   2. Again, relatively, he is backing up at that speed and is not even looking in that direction.

G. Signal well in advance of turning and turn from the proper lane.

H. Never stop on the highway—if you miss a turn, continue to the next turn-off.

I. Before changing lanes:
   1. Check the rearview mirrors to see if a safe gap is open, or soon will be open, in the lane where you intend to go.
   2. Use turn signal and give the operators concerned with your turn time to perceive the signal.
   3. Take a quick but adequate glance over your shoulder, on the side you intend to turn, to cover the "blind spot."
   4. Assuming all-clear ahead, move promptly into the desired lane and stabilize your vehicle.

J. Techniques applied on freeway approach ramps and acceleration lanes are similar to those used in lane changing.
   1. Evaluate the location and speeds of vehicles on the freeway and also any vehicles in front of you on the ramp or acceleration lane. Your rearview mirror will not give you the full picture, so you must use short, quick glances over your shoulder.
   2. Tentatively select a gap in traffic that will permit you to enter the freeway.
   3. Build up speed to coincide closely with traffic flow.
   4. Merge smoothly with the outside lane as lane markings and traffic permit.
   5. Obtain freeway speed as quickly and safely as possible so as not to cause congestion.

K. When preparing to leave a freeway, the traffic to the rear becomes increasingly important.
   1. Signal early.
   2. Position your car to the right of your lane.
   3. Flash your brake lights if traffic is closing in at a high rate of speed.
   4. Avoid slowing down too much while still on a through lane, but quickly conform to advisory speeds for the ramp.
   5. If you miss your freeway exit, drive to the next exit regardless of the distance; and if you turn off at the wrong exit, return to the freeway at an entrance point. (Never back up!)

3.3 Meeting an oncoming vehicle, particularly on a two-lane road, is potentially the most hazardous situation in driving.

A. An oncoming operator may cross the center line into your intended path as a result of:
   1. A momentary distraction.
   2. Recovery from a pavement drop-off.
   3. Blinding rain, snow, fog, dust or smoke.
   4. Poor judgment in passing.
   5. Swerving to miss a bicycle rider, a pedestrian, a road defect or obstruction.
   6. Making a turn.
   7. Excessive speed or lack of control on a curve.
   8. Falling asleep.
   9. Alcohol or drugs.

B. To reduce the risk of meeting an oncoming vehicle:
   1. Keep as far from the center line as practical and on four-lane roads generally use the outside lane.
   2. Constantly check the action of oncoming traffic, so that you will be prepared to take evasive action if someone misjudges and comes into your lane.
   3. Do **not** rely on the approaching car's turn signals.
   4. Reduce speed on older roads and bridges, unless modernized, because these conditions place modern cars dangerously close in passing situations.
   5. When lights are called for, always use your headlights, not your parking lights.
   6. At night switch to low-beam headlights and reduce speed on two-lane roads.
   7. Flick your lights up and down to signal oncoming drivers that their high beams are blinding, but then use the low beam *whether they do or not*. You cannot improve matters by blinding the other person, and you might contribute to an accident.
   8. If other drivers keep signalling their objections to glare from your headlights even when you are on low beam, it probably means that your lights are due for an aiming correction. (A heavy load in the trunk can also raise your lights.)
   9. Condition your mind to the possibility of a vehicle coming across the center line into your path by examining the shoulder and adjacent area and planning an escape route (a ditch is better than a head-on collision).
   10. Actually practice evasive steering at lower speeds.

C. In the event that an oncoming vehicle does pull into your lane, a head-on collision must be avoided at all costs.
   1. Brake immediately but carefully to avoid wheel lock-up, blast your horn, and dodge to the right—onto the shoulder, into a ditch, or into any gap that you can create in the line of cars on the right.
   2. If necessary, you may have to conflict with vehicles in the right-hand lane to reduce the impact from head-on to sideswiping.

3.4 Safe and efficient passing hinges upon good judgment plus a systematic pattern of action.

A. By staying well back of the vehicle to be passed, the operator is in a better position to:
   1. Check the variables ahead which affect decisions.
   2. Accelerate and quickly gain a sufficient superiority of speed when the way is clear.
   3. Stabilize the vehicle in the passing lane before drawing abreast of another car.

B. Pavement markings and signs aid the operator in making a "passing" decision, but you must search for additional information before deciding whether this crucial maneuver is worthwhile, legal, and safe. (When in doubt, don't!)
   1. Grades (vertical curves) on undulating roads were built for cars a foot or two higher, making it difficult to see modern cars in the dips.
   2. The size and color of oncoming vehicles influence the distance judgment of the perceiver.
   3. The operator's view will be obstructed by following another car as it passes, and, in addition, there may not be sufficient space to return to the right lane.

C. Communicating your intention to pass (horn or lights) reduces the chance that the operator being passed will swerve into your lane.
   1. Avoid passing if the operator ahead is about to pass a pedestrian, cyclist, animal, or anything which could cause a sudden swerve.
   2. Also avoid driving alongside in "blind spots" of the other driver longer than necessary.

D. If operators withhold the final decision to complete the passing maneuver until they are in the passing lane near the vehicle being passed, they will have more time to assess the situation ahead and also be better prepared mentally to brake and pull back into the right lane should an obstacle appear in the path ahead.
   1. Decision is *tentative* until that point.
   2. However, operators should proceed to the point of final decision as if they were going to complete the pass.

E. If for any reason the vehicle being passed demonstrates erratic behavior before the point of decision is reached, drop back into the right lane and re-evaluate the situation.

F. By building up a clear superiority of speed over the vehicle being passed, the operator minimizes the time of exposure in the passing lane.
   1. A 15 mph superiority means approximately 8 seconds in the passing lane.
   2. The time required for passing when 15 mph superiority has been built up is the same regardless of the speeds of the two vehicles, *but the distance used up in passing increases as the speed increases.*
   3. Almost one-half mile is needed to make a safe pass at 65 mph if another vehicle is coming from the opposite direction at the same speed.
   4. More time is required to pass a truck, bus or trailer. (Trucks pick up speed on downgrades, so you must catch a truck at the beginning of the downgrade to pass.)
   5. Because of air resistance and a reduction of power available at the rear wheels, it takes longer to accelerate and pass at high speeds; (a) Acceleration power decreases as speed increases—it takes longer to accelerate from 60 mph to 70 mph than it does from 50 mph to 60 mph, and (b) This is true of every car, but each car has a variable rate of acceleration.

G. By remaining in the passing lane until the front of the car being passed appears in the rearview mirror, drivers are assured that they can return to the right lane without cutting off the passed vehicle.
   1. A brief glance over the right shoulder is a good habit to develop, particularly in congested, urban areas.
   2. Give the operator being passed the following distance that you would like to have.

H. The same key passing rules apply on four-lane undivided highways as on two-lane rural highways except:
   1. The passing differential in speed is not as crucial as it is on a two-lane highway.
   2. Instead of judging your pass to reduce exposure in the passing lane, you need a steady speed, flowing and blending with the traffic.
   3. Passing on the right is permitted (see state laws).

I. In a passing situation, if you misjudged the speed and distance of an oncoming car:
   1. Try to brake and fall back in behind the vehicle you intended to pass.
   2. Accelerate and return to your lane ahead of the vehicle you are passing.
   3. The choice of swerving off to the left should not be considered when an oncoming vehicle is close because that is the best escape route.

J. When being passed maintain an even speed; but if the operator passing you misjudges the distance of an oncoming vehicle, you may be compelled either to:
   1. Accelerate and let them drop back into your lane (make certain that this is the intent).
   2. Decelerate, poise foot on brake, and look for an escape route if needed.

3.5 Regardless of one's driving ability, sooner or later there will be need for a lane change.

A. Factors that influence a driver to change lanes might include:
1. Weather conditions.
2. Road surface conditions.
3. Other drivers' actions.
4. Necessity to make a turn.
5. Traffic flow.
6. Objects in the road.

B. Procedures for lane changing should be as follows.
1. Determine a space interval between cars if other traffic is involved.
2. Check mirrors for traffic.
3. Look over your shoulder in the direction of the turn.
4. Signal your intention to change lanes.
5. Change lanes and match the speed of any vehicles involved.

3.6 Maneuvers used to turn a car around so that it is headed in the opposite direction are collectively termed as turnabouts. The types include U-turns, two-point turns, Y-turns or three-point turns.

A. Of the three basic turnabouts, the U-turn is the simplest and the one with the least amount of risk. Directions for a U-turn would include:
1. Signal a left-hand turn.
2. Turn left sharply.
3. Proceed in new direction.

B. Two-point turns are often used to reverse directions of your car on narrow streets.
1. This turn requires the car to be backed into an opening, alley or driveway on the side of the street.
2. Pull to the right just beyond the opening.
3. Back into the opening.
4. When traffic is clear, make a left turn in your new direction.

C. When there is no opening on the right side of the street, a two-point turn can be made by:
1. Crossing over the left lane of traffic, turning left into an opening, alleyway or driveway.
2. Back into the lane of traffic while turning right.
3. Proceed in the new direction.

D. A Y-turn, or three-point turn, is the most dangerous of all turns and should be avoided if possible.
1. This turn may be necessary when you cannot complete a U-turn or two-point turn.

E. Directions for a Y-turn would include:
1. Signal for a left turn.
2. Move forward slowly, turning steering wheel hard to the left.
3. Just before reaching the curb or edge of roadway on the left, turn the steering wheel quickly to the right.
4. Back while turning to the right.
5. When there is sufficient lane space, drive forward.

3.7 Parking a vehicle calls for application of maneuvers already learned. These must be completed, however, in tight quarters.

A. Right angle and diagonal parking are the least difficult to perform.
    1. Position car so your front bumper is just beyond the left rear of the car to the right of your intended space.
    2. Turn sharply right, enter the space slowly.
    3. Check danger points—your left front bumper and your right rear fender.

B. This type of parking is often found in cities and towns and in parking lots.

C. Parallel parking involves parking between two vehicles.
    1. Align rear bumper of your car and the car ahead of your chosen space.
    2. Back slowly while turning the steering wheel to the right, aim at the right rear corner of the space.
    3. When your right door lines up with the rear bumper of the car ahead of your space, start turning the steering wheel to the left.
    4. When your front bumper clears the rear bumper of the car in front of you, turn sharply left and continue to back into the space.
    5. Center your car in the space.

D. Parking an automobile on a hill requires additional skills and procedures to keep the car from becoming a runaway.
    1. Uphill with a curb—turn the wheels sharply away from the curb, let wheels rest against curb.
    2. Downhill with a curb—turn the wheels sharply toward the curb, let wheels rest against curb.
    3. Uphill and downhill without a curb—turn wheels sharply toward the shoulder of the roadway.

Learning Guide 19

Timed Intervals and Following Distances

We all know that following a car too closely may result in a rear-end collision. The rule often recommended for establishing the proper following distance states that the proper following distance is one car length for each 10 miles per hour of speed. For example, if you are traveling at 30 mph, you should be 3 car lengths behind the car you are following. If you are traveling 60 mph you should be 6 car lengths behind. This rule takes into consideration such factors as your reaction time and the braking time required by you and the driver of the car you are following.

This rule is hard to use because it is difficult to judge the distance between you and the car ahead when both vehicles are moving. But, there is an easy and convenient method for applying the rule. It is called the "Timed Interval Technique."

Let us assume that the average car length is 30 feet. Of course, cars are not this long, but we use this figure to simplify the technique we are about to explain and to add an extra margin of safety. If you are driving at 40 mph, you should stay 120 feet behind the car ahead of you (one car length per 10 mph of speed, 4 x 30 = 120). At 40 mph your car travels 60 feet in one second, so when you are 120 feet behind the car ahead in terms of distance you will be 2 seconds behind in terms of time interval. Thus, when you are at the proper following distance for this speed, you will reach road markers, signs, and other objects on the highway 2 seconds after the car ahead of you has passed them.

The table below shows that, regardless of speed, to maintain a following distance of one car length for each 10 mph of speed, you should be 2 seconds behind the car ahead (assuming that a car length is 30 feet).

Speed in mph	Proper Following Distance*		Distance Traveled in One Second	Time Interval
10 mph	1 car length:	30 ft.	15 ft.	2 sec.
20 mph	2 car lengths:	60 ft.	30 ft.	2 sec.
40 mph	4 car lengths:	120 ft.	60 ft.	2 sec.
60 mph	6 car lengths:	180 ft.	90 ft.	2 sec.

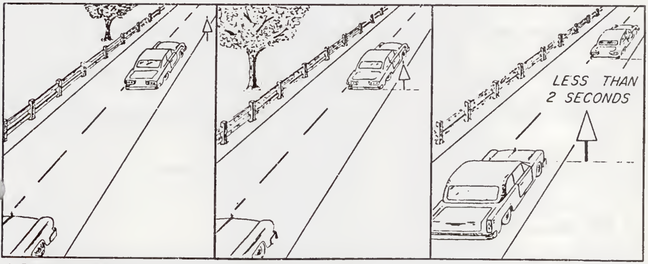
*Assume a car length equals 30 ft. and a proper following distance is 1 car length for each 10 mph.

Therefore, the following-distance rule can be translated to read: regardless of the speed at which you are traveling, under normal conditions, always maintain at least a 2-second time interval between your car and the car ahead of you. **Wet or icy roads require a longer time interval.**

Learning Guide 20

Using the Timed Interval Technique

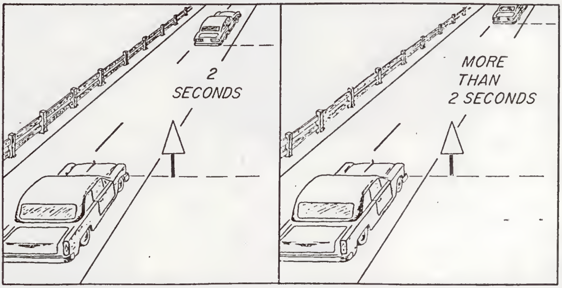
While driving, you will naturally be watching the car ahead as well as the general traffic situation. It will be easy, therefore, for you to notice when the rear of the car ahead passes some fixed object near the side of the road, such as a sign post, mail box, telephone pole, etc. As the rear of the car ahead passes the selected object or check point, start to count to yourself—one-thousand-one, one-thousand-two. This counting method gives a close approximation of time in seconds. If it takes less than 2 seconds for the front of your car to reach the check point, you are **too close** to the car ahead. If it takes 2 seconds for the front of your car to reach the check point, your following distance is proper. And, if it takes more than 2 seconds for your car to reach the check point, your following distance is greater than necessary for safety. Remember, you should try to maintain a 2-second time interval between your car and the car ahead, regardless of your speed.



A. The car ahead is approaching a check point (the triangular sign).

B. Begin counting seconds as the rear of the car ahead passes the check point.

C. If it takes less than 2 seconds for the front of your car to reach the check point, you are **too close** to the car ahead.



D. If it takes 2 seconds for the front of your car to reach the check point, your following distance is **proper.**

E. If it takes more than 2 seconds for the front of your car to reach the check point, your following distance is **greater than necessary for safety.**

Learning Guide 21

Being Followed

Task		Rationale
1.	Space cushion (flow of traffic)	Don't interrupt flow of traffic. Leave a margin of safety forward, to the rear and sides of your vehicle at all times.
2.	Traffic (inform)	
	a. Signal (turning off)	a. Inform driver behind of direction your vehicle will take.
	b. Signal (passing)	b. Inform driver behind that a change of lanes will occur.
	c. Speed (slowing)	c. Show brake lights early (controlled braking) to inform driver behind of intentions.
	d. Obstructions ahead	d. Inform drivers behind of dangers they may not see.
3.	Tailgaters (minimize)	
	a. Tap brakes	a. Inform following vehicle to slow down and maintain space cushion.
	b. Change lanes	b. Allow following vehicle to overtake and pass.
	c. Pull over and stop	c. Allow following driver to pass.

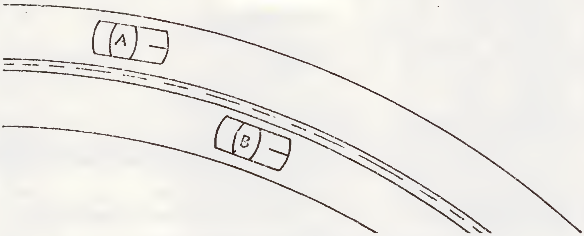
Learning Guide 22

Passing

Task	Rationale
1. Traffic (check)	Make sure it is clear to pass. Check mirrors. Look ahead, behind and check blind spots.
2. Signal (left)	Inform others of desire to pass.
3. Steer (slightly)	Check blind spots before steering action begins.
4. Accelerate	Increase speed to overtake vehicle in minimum time and distance.
5. Horn (sound) Lights (blink)	Inform driver you are passing if situation so dictates.
6. Mirror (check)	Both headlights of vehicle being passed should be viewed in mirror to insure adequate space cushion. Consider possibility of utilizing blind spot check.
7. Signal (right)	Inform driver you are returning to driving lane.
8. Lane change	Return to right lane of traffic as soon as space cushion is adequate. Leaving passing lane minimizes possible oncoming traffic conflict.
9. Signal (cancel)	Inform others you have completed passing maneuver.
10. Speed (maintain)	Maintain speed with flow of traffic and keep a space cushion.

Learning Guide 23

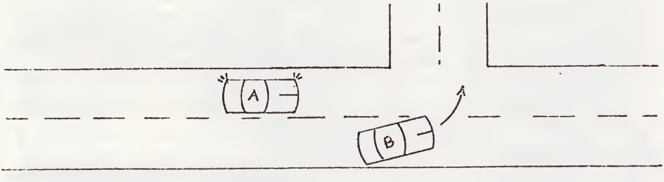
Passing and Being Passed



Car A is passing Car B on a blind curve.

1. Even if there is no oncoming traffic, what difficulty does Driver A confront in completing the pass?

2. What evasive action should Driver B take?



Car A is passing Car B when Car B decides to turn left without warning.

1. What options does Driver A have?

2. What options does Driver B have?

Learning Guide 24

Being Passed

Task	Rationale
1. Lane position (maintain)	Vehicle must have space to pass; do not crowd passing vehicle. (What would happen if vehicle were moved toward center line while being passed?)
2. Speed (maintain)	Speed should be maintained so passing vehicle is aware of the speed which it and passed vehicle are traveling. If passed vehicle slows down, this may affect or distort the judgment of passing driver as to when to proceed into other lane.
3. Traffic (check)	Mirrors should be checked to make sure there are no other vehicles attempting to pass or approaching from rear. Must make visual check forward to check for oncoming vehicles. Visual check forward to see that passing vehicle does not return to your lane suddenly. Constant preparation for evasive action must be maintained.

Learning Guide 25

Lane Changing

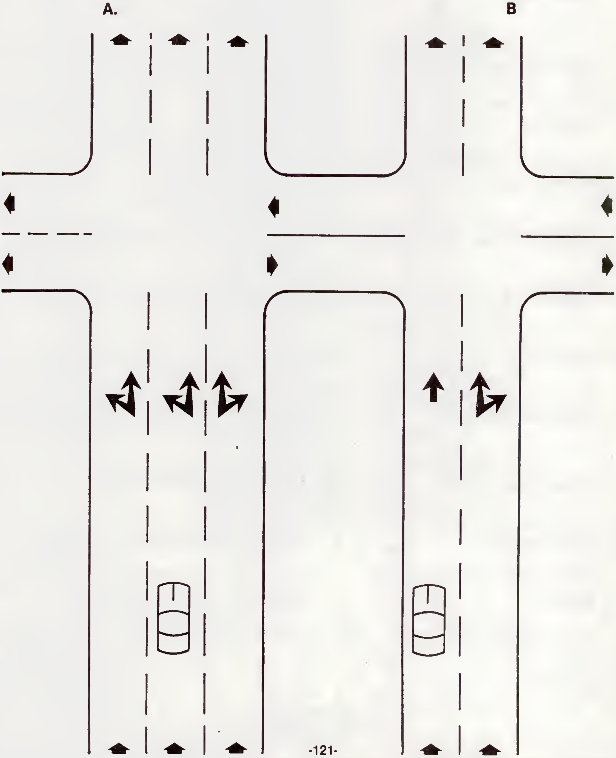
Task	Rationale
1. Lane (selection)	Will the lane selected accomplish the driver's goals?
2. Lane (position)	Adjust the position of vehicle within the traffic pattern. Prepare to change lanes.
3. Mirrors (check)	Check to the rear and to the sides to see if a safe gap is available in the lane into which driver intends to move.
4. Signal (on)	To give other drivers concerned time to identify the signal—about three seconds. This gives the drivers time to adjust their positions if necessary.
5. Blind spot (glance)	Check over your shoulder and make sure no one is overtaking you in the lane you plan to enter. Regardless of which lane you are changing to, it is imperative to head check to prevent traffic conflicts.
6. Steer (smoothly)	When it is clear, angle vehicle smoothly and promptly to desired lane. This maintains uninterrupted traffic flow.
7. Accelerate (slightly)	Move promptly but not abruptly into the desired lane. Adjust speed to the flow of traffic.
8. Steer (straighten)	When vehicle has entered desired lane, center vehicle in lane.
9. Mirrors (check)	Check traffic to rear and sides.
10. Signal (off)	Turn signal off as a means of informing other drivers you have safely completed lane change.

Learning Guide 26

Lane Changing

Complete the following diagrams, using arrows for:

1. A left turn from a 3 lane one-way to a 2 lane one-way.
2. A right turn from a 2 lane one-way to a two-way street.



Learning Guide 27

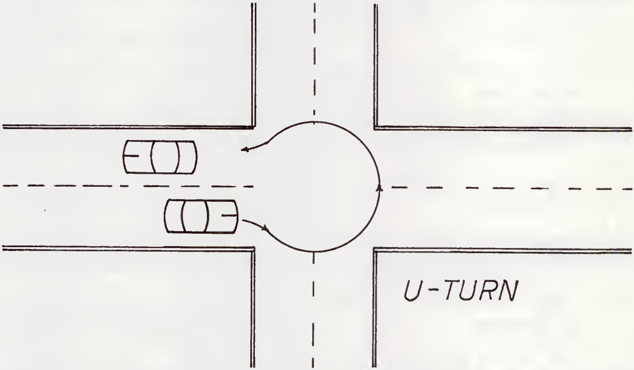
U-Turn

Task	Rationale
1. Traffic (check)	Be certain the roadway is clear of traffic. (What does Montana code require for a U-turn to be legal?)
2. Traffic (check mirrors)	Is a vehicle tailgating? Is a vehicle approaching rapidly from behind?
3. Signal (on)	Inform other drivers of your intention to move to right side of roadway.
4. Foot brake (on)	To slow vehicle, enabling the driver to begin turning to the right.
5. Steer (to right side of roadway)	Position vehicle to successfully make the U-turn.
6. Traffic (check)	Be sure you will have a clear roadway to complete entire maneuver.
7. Signal (on)	Inform other drivers of your intentions to turn left in roadway.
8. Steer (sharp left)	Complete turn in a single motion by turning the steering wheel as far to the left as possible.
9. Signal (cancel)	Did signal cancel automatically?
10. Lane (placement)	Get vehicle centered in proper driving lane.
11. Speed	Accelerate to normal traffic speed.

Learning Guide 28

Turns

Study the diagram below. When you think you know it, check yourself by answering the questions below the diagram. Draw or mark on the diagram if you think it will help you.



1. What are the danger points you encounter in making a U-turn?

2. What signal, if any, would you use in making this turn?

3. What traffic directions should be checked before and during this turn?

4. Under what conditions may this turn be made in residential or business districts?

5. If you were half-way through this turn and a car approached from the left, what should you do?

Learning Guide 29

Two-Point Turn

Task	Rationale
1. Turn (left)	Following turn, driver will begin turnabout maneuver.
2. Brake (stop)	Complete left turn.
3. Traffic (check)	Driver must determine a clear path of movement.
4. Shift ("R")	Driver should make sure vehicle is in reverse.
5. Back (intersection/roadway)	Approaching traffic has right-of-way.
6. Brake (stop)	Driver does not want to enter roadway without making constant traffic checks.
7. Traffic (check)	Driver must be aware of traffic in roadway. There must be enough room to complete the maneuver safely.
8. Steering (turn)	Turn is made into right lane.
9. Brake (stop)	Complete two-point turn. Check for overtaking traffic.
10. Shift ("D")	Two-point turn has been completed and driver is ready to move in forward direction.

Learning Guide 30

Three-Point Turn

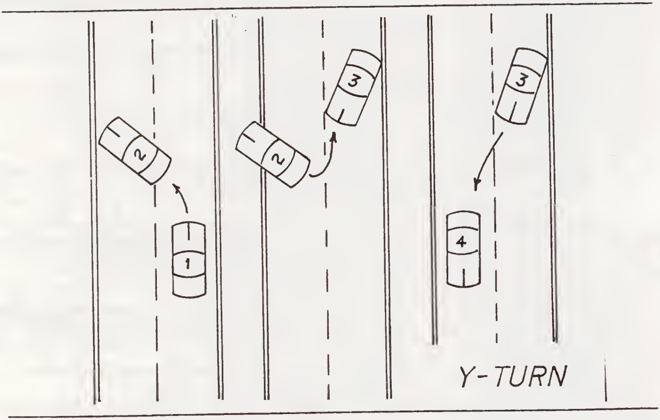
(Y-Turn)

Task	Rationale
1. Traffic (check)	Determine traffic flow and be certain your path is clear at all times during the turn.
2. Signal (right)	Inform other drivers of intention to move to right edge of pavement.
3. Brake (slightly)	Speed control in preparation for turn-around.
4. Signal (left)	Inform other drivers of intention to enter traffic.
5. Steer (sharply)	Damaging to power steering units to turn wheels sharply while vehicle is not in motion. Safest to complete as much of the turn as possible in the first turn.
6. Signal (cancel)	You have informed other drivers that a part of the maneuver has been completed.
7. Shift ("R")	Prepare vehicle for backward motion.
8. Steer (sharply)	Position vehicle for completion of maneuver.
9. Stop	Continue looking to rear until stop is complete.
10. Shift ("D")	Prepare for forward motion.
11. Traffic (check)	Determine if roadway is clear.
12. Accelerate	Blend with traffic.

Learning Guide 31

Y-Turn

Study the diagram below. When you think you know it, check yourself by answering the questions below the diagram. Draw or mark on the diagram if you think it will help you.



1. What are the danger points you encounter in making a Y-turn?

2. What signal, if any, would you use in making this turn?

3. What traffic conditions should be checked before and during this turn?

Learning Guide 32

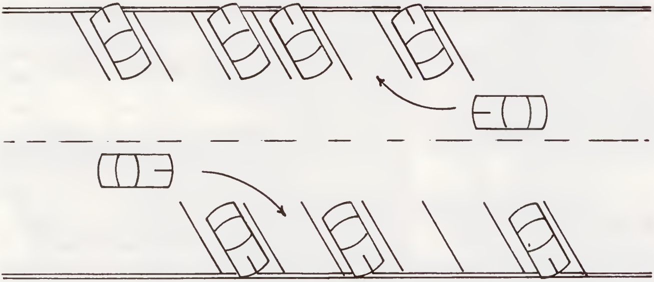
Angle Parking

Task	Rationale
1. Traffic (check)	Driver must make sure path is clear to make maneuver. NOTE: Angle parking can be performed on either left or right side of roadway.
2. Signal (on)	Inform other drivers of your intentions.
3. Brake (reduce)	Maneuver must be made at a slow, controlled speed.
4. Lane (placement)	Placement is very important, especially in one-way traffic. Driver must be in position to begin turning procedure by utilizing all available space.
5. Steering (direction)	Approach the parking space at the best possible angle. Check primary danger points. (Which two fenders should be checked?)
6. Steer (recovery)	Straighten wheels so vehicle is centered in space. Be extremely careful to observe front fender and back fender. Let vehicle move slowly forward until front wheels touch the curb.
7. Brake (stop)	Complete maneuver by securing vehicle.
8. Mirrors (check)	Driver needs to know if the path is clear before starting the exit maneuver.
9. Back (straight)	Back until front of vehicle has clearance to perform turning. Clearance conditions vary. (Which are the two most dangerous points of conflict?)
10. Brake (stop)	Complete maneuver. Prepare vehicle for forward movement. Check for overtaking vehicles. Pull out into traffic.

Learning Guide 33

Angle Parking

Study the diagram below. When you think you know it, check yourself by answering the questions below the diagram. Draw or mark on the diagram if you think it will help you.



1. Which two fenders are danger points in this type of parking?

2. What other possible dangers might you look for while parking?

3. What is the danger of not having the car parked in the center of the parking space?

4. When turning right into the parking space, do the back wheels follow in the same path as the front wheels?

5. What visual search is necessary before and during this procedure?

Learning Guide 34

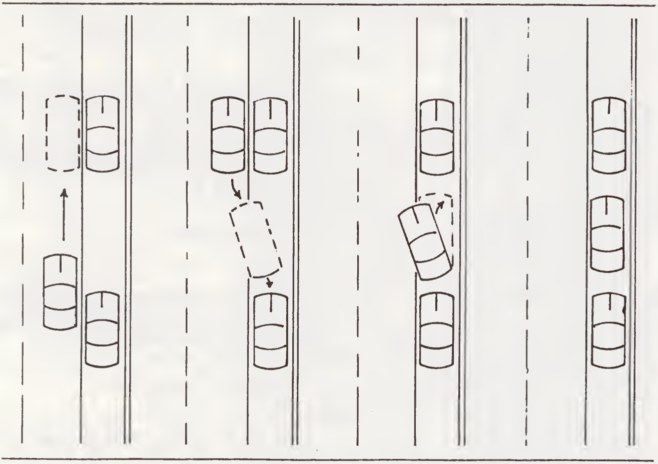
Parallel Parking

Task	Rationale
1. Signal (hand and brake)	Give early indication to allow driver in rear to adjust speed or position.
2. Stop	Stop parallel two to three feet from parked car in front of the parking space with rear bumpers aligned.
3. Traffic (check)	Drivers must check to the rear to make sure they have room to start parking procedure. (How long is your car? How long is the space?)
4. Shift ("R")	Place shift lever in reverse.
5. Steer (sharply)	Driver must turn steering wheel to move the rear of the car into parking space. Back slowly. Check to sides, front and rear for all possible traffic hazards.
6. Steer (straighten)	Vehicle must enter space.
7. Steer (sharply)	Front of vehicle must be placed within space.
8. Wheels (straighten)	When vehicle is nearly parallel with curb, straighten wheels.
9. Placement (centered)	Place gear shift in drive, move forward and center vehicle in lane. Must be a maximum of 18 inches from curb.
10. Parking on a grade	Upgrade—wheels turned away from curb. Downgrade—wheels turned toward curb. Grade without curb—wheels turned toward edge of roadway.

Learning Guide 35

Parallel Parking

Study the diagram below. When you think you know it, check yourself by answering the questions below the diagram. Draw or mark on the diagram if you think it will help you.



1. What are the danger points encountered when parallel parking?

2. What turn signal, if any, should be used for parallel parking?

3. What signal can be given to show the car following that you intend to park?

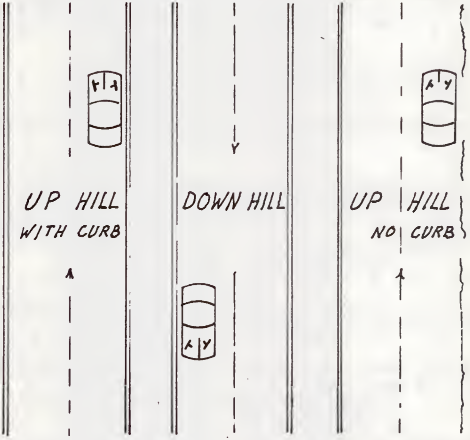
4. What visual checks are necessary before and during the parking procedure?

5. What would courteous drivers do if they planned to park and the car behind followed too close and wasn't able to back up?

Learning Guide 36

Parking on a Hill

Study the diagram below. When you think you know it, check yourself by answering the questions below the diagram. Draw or mark on the diagram if you think it will help you.



1. What are the possible danger points when parking on a hill?

2. What signal, if any, is necessary before performing the parking procedure?

3. Why turn your wheels into the curb when you can set your parking brake?

4. What visual scan would be necessary before and during this procedure?

5. When parking on a hill, what is the danger in parking too far from the curb?

6. Why is the procedure for parking uphill without a curb the same as parking downhill?

Pre/Post Assessment

Movement Within Traffic Flow

1. When parking uphill without a curb, you turn your wheels toward the side of the roadway.
   _____True _____False

2. You should always look over your left shoulder when lane changing.
   _____True _____False

3. A U-turn is the most dangerous type of turnabout.
   _____True _____False

4. The major danger points of angle parking are your left front and right rear fenders.
   _____True _____False

5. In bad weather you should increase your 2-second following distance.
   _____True _____False

6. If someone cuts in front of you and shortens your space cushion, you should slow down slightly to regain it.
   _____True _____False

7. When parking downhill with a curb, turn your wheels away from the curb.
   _____True _____False

8. You are being passed by another car and a car is swiftly coming in the opposite direction. You should:
   _____A. Accelerate and let the car passing get back in the lane.
   _____B. Cram the brakes.
   _____C. Steer to the right and slow down.

9. It is safe to pass climbing a hill when:
   _____A. The driver in front blinks his lights, signifying a clear road ahead.
   _____B. The front vehicle moves to the shoulder even when a solid line exists in your lane.
   _____C. Driver motions you to pass.
   _____D. None of these.

10. What should drivers do if a car cuts too closely in front of them?
    _____A. Move sharply to another lane.
    _____B. Slow down to increase the following distance.
    _____C. Speed up, pass the car, and get away from it.
    _____D. Maintain this new following distance so as not to shorten the following distance of the car behind them.

11. Which of the following poses the greatest danger to the driver who wants to pass?
_____A. The possibility of car failure.
_____B. Unexpected, blind intersection ahead.
_____C. The likelihood of sudden, unexpected holes or bumps in the road.
_____D. His/her own error in judgment and impatience.

12. What should a driver do when being tailgated?
_____A Pull off the road as quickly as possible.
_____B Speed up and slow down intermittently to discourage the "tailgater" from following too closely.
_____C Slow down enough to encourage the "tailgater" to safely pass.

13. The two-second time rule implies that:
_____A A driver must pass and return to the original lane within two seconds.
_____B A driver must maintain a two-second interval space behind the vehicle he is following.
_____C A driver must check mirrors every two seconds.
_____D A minimum of two seconds is necessary for signaling for a turn.

Pre/Post Assessment Answers

Movement Within Traffic Flow

1. True
2. False
3. False
4. True
5. True
6. True
7. False
8. C
9. D
10. B
11. D
12. C
13. B

Appropriate Instructional Materials
Movement Within Traffic Flow

Filmstrips: "Passing Maneuver," "Driving Strategy," "Decision Pattern," "Strategic Positioning," "The Final Factor," by Ford Motor Company. Purchase from Bumpa-Tel, P.O. Box 611, Cape Girardeau, MO 63701.

Slides: "A Following Distance You Can Count On," "Better Backing," "The Perfect Pass," National Safety Council, 425 N. Michigan Ave., Chicago, IL 60611.

Filmloops: "Parallel Parking," "Angle Parking," "Parking on Inclines," "Y Turns," "U Turns," Film Loops Inc., P.O. Box 2233, Princeton, NJ 08540.

"The Case of the Incomplete Pass," "The Case of the Weaver with the Monkey on His Back," Aetna Driver Services, 151 Farmington Ave., Hartford, CT 06156.

Film: "Space Driving Tactics," Montana State Film Library, No.6323.

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pp. 116-123, 135-140, 204-207, 220-221, 225-227, 272

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Sportsmanlike Driving.
pp. 45-64, 70-78, 94, 127, 146-148, 162

Tomorrow's Drivers.
pp. 32-36, 39-45, 81-83, 99, 104, 117-119, 137, 141, 218-219

Unit B: Interacting with Other Highway Users

4.0 Intersections

Principle: A large share of traffic accidents occur at places where two or more traffic flows mix, typified by various types of intersections. This is true because of the numerous opportunities for conflict. To avoid conflict and negotiate intersections safely, vehicle operators must apply all of their mental and physical skills, promptly and precisely.

4.1 Approach

Objectives/ Student Behavior: When shown approach positions to various kinds of intersections, identify and appraise relevant cues and state effective means of handling the situations. The student will identify intersection as controlled or uncontrolled and determine reasons for such actions. The student will draw four intersections located in the community and discuss why intersecting is so critical.

Learning Activities: Discuss and illustrate proper traffic movement in various types of intersections. Study Learning Guides 37 and 38. Discuss the visual search: check left, straight ahead, right, and left again before entering intersection. Stress the point that each intersection is different and may require a different search pattern. Stress blind spots at intersections. Analyze braking at different intersections; crossing and merging at a stop sign; yielding the right-of-way. Complete Learning Guides 39 and 40.

4.2 Railroad Crossings

Objectives/ *Student Behavior:* Students will be able to explain the mental errors committed by vehicle operators that cause railroad crossing accidents, and how these errors can be overcome. In addition, students will be able to describe the proper steps to follow if the car stalls on railroad tracks. Students will identify hazards and precautions necessary to negotiate railroad intersections safely.

Learning Activities: Discuss why partially used railroad tracks are often more dangerous than well used ones.

Content

4.0 Intersections markedly increase the chances of conflict with other highway users.

4.1 When approaching an intersection, special considerations and checks will facilitate safe and efficient progress for the operator.

A. An intersection is not always defined by signs or traffic signals; for example, factory parking lots and shopping center entrances and exits often create hidden intersections in the middle of the block. Rural intersections may reveal themselves through crossing or turning cars, rows of houses, trees, fences or telephone lines, and signs.

B. An *initial* scanning of the intersection and *traffic to the rear* serves to identify those elements which will affect decisions and present potential hazards. Look for traffic controls, impediments to vision, pedestrians at an approaching intersection, and other characteristics of the intersection.

C. An appropriate approach speed—one that is sufficiently low to permit the driver to stop short of the intersection should conditions warrant such a move—depends largely on the traffic controls, traffic volume and how much sight distance the driver has in relation to the intersecting street.
   1. The shorter the unobstructed view of the crossroad, the lower the safe speed for approaching the intersection (may necessitate a stop).
   2. When view is obstructed, reduce speed so that the point of decision can be withheld until sight distance is adequate.
   3. A typical "slow down and look" approach to an uncontrolled intersection requires only a few seconds.

D. To negotiate a signalized or signed intersection, operators must apply additional knowledge and skill.
   1. The mere presence of a traffic signal or a sign is a warning of a danger zone, regardless of the color of the light.
   2. Occasionally, you will encounter an operator who attempts to beat the light, or one who simply failed to see the light.
   3. If an operator is stopped for a red signal and it changes to green, you are still required to yield to other vehicles and pedestrians lawfully within the intersection or in adjacent crosswalk at the time such green light is exhibited.
   4. Be extra alert as you approach a "stale green."
   5. "Covering" the brake (foot poised on the brake) as you approach an intersection minimizes execution time distance should a stop be required.
   6. Watching your speed, the signals well ahead, and other cues will help you to pace yourself with the signal's timing, especially if it is a "progressive" system.
   7. Operators approaching a yield sign shall slow down, or shall stop and yield the right-of-way to any vehicle in the intersection or approaching on another highway so closely as to constitute an immediate hazard. Continue to brake as at a stop sign until certain there is no need to stop.
   8. Operators approaching a stop sign shall stop and *yield the right-of-way* to any vehicle which has entered the intersection or which is approaching so closely as to constitute an immediate hazard. A stop sign tells drivers that they must stop, but does not necessarily tell them exactly where to stop.
   9. A flashing red light has the same meaning as a stop sign; a flashing yellow light the same as a "slow" or caution sign (slow down and be prepared to stop).
   10. A green light permits the operator to proceed if the way is clear; it does not assure safe passage through the intersection.
   11. When a traffic officer is on duty at a signalized intersection, the officer's directions take precedence over the lights.

E. A careful check to the left, straight ahead, to the right, and left again will furnish the operator with the information needed to make a final decision about passing through the intersection. (Each intersection is different and may require a different search pattern.)

F. Drivers communicate their intentions to turn by positioning his vehicle in the appropriate lane and flashing their turn signals.
   1. The proper approach lane for an intersection turn, unless otherwise marked, is the one closest to the direction of the turn. This blocks anyone from trying to pass on the side toward which the driver is turning.
   2. In situations where you suspect an operator following or approaching you does not see your turn flasher because of bright sunlight or inattention, use an arm signal.
   3. If turn signals are flicked on prematurely, other operators may draw incorrect inferences about where the turn is about to be made.

G. At a signalized intersection it may be appropriate to enter the intersection and wait for a safe gap in traffic to complete a left turn movement.

H. Keeping your wheels straight when you stop to wait for a safe gap in traffic to make a left turn minimizes the chances of being driven into the lane of oncoming traffic if struck from the rear.

I. Wait to make your turn onto a main highway until you have space and time to gain cruising speed without interfering with the progress of other vehicles.

J. Conflicts at intersections are reduced by turning into the first lane going in your direction. Traffic engineers sometimes modify this principle to meet local conditions.

4.2 Through an understanding of the hazards involved, and heeding certain elementary but crucial precautions, operators can safely cross train-car intersections.

A. Operators should consider that:
   1. most railroad crossing accidents result in fatalities;
   2. a train gives the illusion of going slower than it is actually traveling;
   3. by the time that an engineer can tell that your car is in the way, it is already impossible for him to stop (a full emergency stop from 60 mph takes 1½ miles);
   4. in a large percentage of railroad crossing accidents, the vehicle runs into the side of the train because the operator was overdriving his/her vision and perception; and
   5. with fatal results, some operators have taken familiar crossings for granted and assumed that no train would be coming (you are just as dead if struck by an unscheduled train).

B. To move safely through a vehicle-train intersection:
   1. make certain the engine is thoroughly warmed up before attempting to cross the tracks;
   2. identify and conform to warning signs, signals and protective devices;
   3. look and listen for approaching trains, but do not put the sense of hearing under handicap (reduce the radio volume, crank down the side window, and stop conversation);
   4. if a train is approaching close enough to constitute a hazard or if the warning signals or gates are operating, stop a safe distance from the nearest rail;
   5. wait for the train to clear a sufficient distance to insure good visibility. A train may be coming from the same or opposite direction on an adjacent track; and
   6. drive onto a railroad track only when you are certain that you have sufficient speed so that the momentum will carry the car past the tracks should the engine fail, and make certain that no other vehicle in front can prevent your uninterrupted crossing.

C. If, in spite of all these precautions, the vehicle stalls on the track:

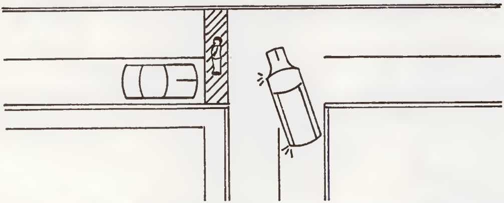
1. get everyone except yourself out and well away from the car immediately;
2. if a train is in sight, get out and leave the tracks in the direction from which the train is coming to avoid being struck by fragments;
3. if no train is in view, try to start the engine checking every few seconds to make sure that a train is not coming (not if the tracks curve out of sight in less than one-half mile); and
4. if the vehicle fails to start, perhaps you can push it off the track. In a manual transmission, put in low gear and use the starter.

Learning Guide 37

Intersecting

1. Question: Where are you supposed to stop at intersections and why?

   Answer: Before you reach the sidewalk (crosswalk) in order to allow proper movement of pedestrians and vehicles.

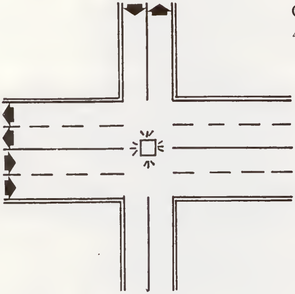


2. Question: Why are intersections (and knowledge of) so important to safe traffic operations?

   Answer: Over one-third of all accidents occur in intersections because they bring together vehicles heading in different directions.

3. Question: What are some of the difficulties in recognizing proper procedures within intersectional maneuvering?

   Answer: Some intersections are *controlled* (operated according to signal light, sign, or traffic police), while others are *uncontrolled;* intersections are constructed in different patterns in combinations of one-way and two-way streets.

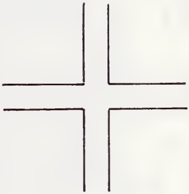


CONTROLLED
4 - WAY SIGNAL

Learning Guide 38

Designs of Intersections

A.



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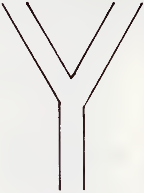

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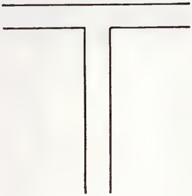

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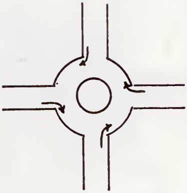

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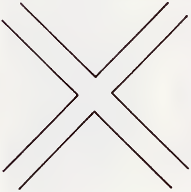

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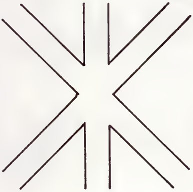

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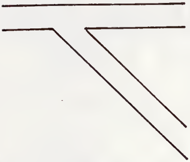

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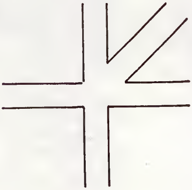

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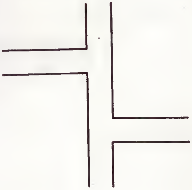
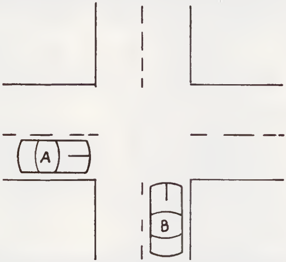


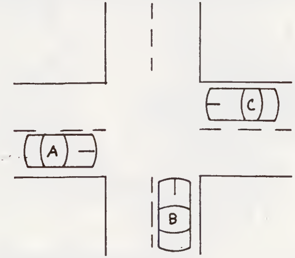
Learning Guide 39

Intersections

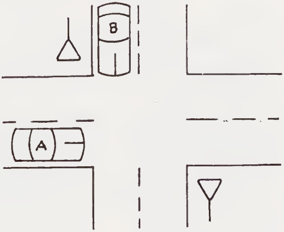
1. If cars A and B arrive in an *uncontrolled* intersection at the same time, who has the legal right-of-way?
   _____A. Car A
   _____B. Car B



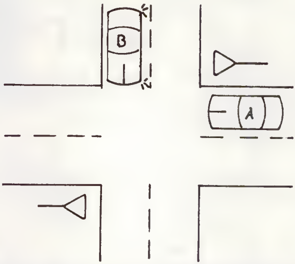
2. If cars A, B, and C arrive in an *uncontrolled* intersection at the same time, who has the legal right-of-way?
   _____A. Car A
   _____B. Car B
   _____C. Car C



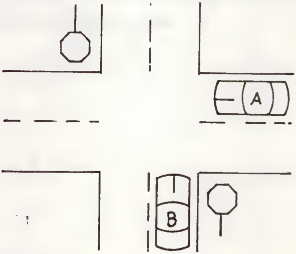
3. Car B arrives just before car A. A yield sign is facing car B. Who yields?
   _____A. Car A
   _____B. Car B



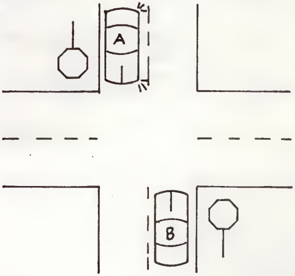
4. Car A arrives just before car B. A yield sign is facing car A. Car A is going straight. Car B is turning left. Who yields?
   _____A. Car A
   _____B. Car B



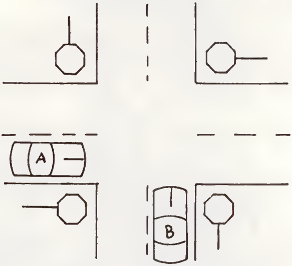
5. Car B arrives first at a stop sign and comes to a stop. Car A is approaching. Who yields?
   _____A. Car A
   _____B. Car B



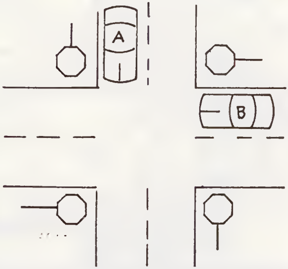
6. Cars A and B arrive at a stop sign at the same time. Car B is going straight. Car A is turning left. Who yields?
   _____A. Car A
   _____B. Car B



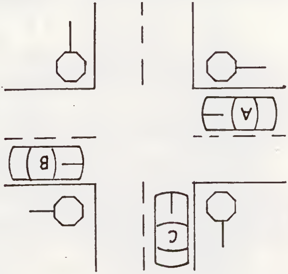
7. Car B stops first at a four-way stop. Who has the legal right-of-way?
_____A. Car A
_____B. Car B



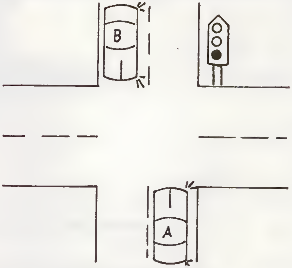
8. Cars A and B stop at the same time at a four-way stop. Who has the legal right-of-way?
_____A. Car A
_____B. Car B



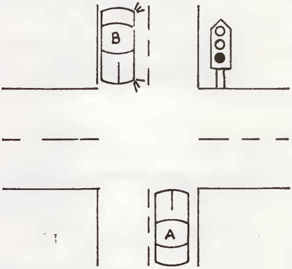
9. Cars A, B, and C all stop at the same time at a four-way stop. Who has the legal right-of-way?
_____A. Car A
_____B. Car B
_____C. Car C



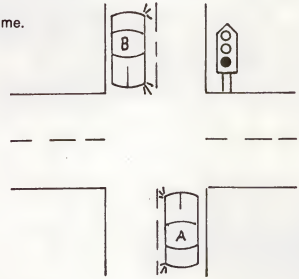
10. The traffic light turns green. Car A turns right and car B turns left. Who goes first?
_____A. Car A
_____B. Car B



11. On a green light car A goes straight and car B turns left. Who goes first?
_____A. Car A
_____B. Car B



12. The traffic light turns green. Cars A and B are turning left. Who goes first?
_____A. Car A
_____B. Car B
_____C. Both can turn at the same time.



Learning Guide 40

Intersections

Task	Rationale
1. Lane (selection and placement)	Determine direction and path of travel. Proper positioning of vehicles reduces need for sudden and evasive actions.
2. Speed (controlled)	Decision must be made to begin braking and determine speed to avoid an intersection conflict.
3. Visual search (check)	In most cases, check traffic left, forward and right. Exception would be made if the left side of intersection presents the shortest sight distance. In that case, check longest sight distance first.
4. Signs and signals (identify)	Are signs facing two directions? Three directions? Four directions? Are there combinations of different types of signs?
5. Execute (action)	After deciding what to do, execute your action. (What precautions are involved when approaching an intersection?)

Pre/Post Assessment

Intersections

1. The appropriate speed for approaching an intersection should be:
   _____A. Slow enough to stop before the intersection if necessary.
   _____B. The posted speed limit.
   _____C. Faster than traffic coming from the side.

2. "Covering the brake" as you approach an intersection
   _____A. is a requirement.
   _____B. minimizes execution time if a stop is necessary.
   _____C. will let other drivers know you can stop.
   _____D. is not recommended.

3. Which statement is correct concerning railroad crossing accidents?
   _____A. A train gives the illusion of going slower than it actually is.
   _____B. Most railroad crossing accidents result in fatalities.
   _____C. Trains could stop if they wanted to.
   _____D. None of the above are true.
   _____E. Both A and B are correct.

4. If a vehicle stalls on railroad tracks, you should
   _____A. get everyone out of and away from the vehicle.
   _____B. try rocking the vehicle; let passengers remain inside.
   _____C. try to back out; do not attempt to go forward.

5. While waiting to make a left turn at an intersection, it is a bad habit to turn your wheels left. The major problem is:
   _____A. It is hard on the tires.
   _____B. It is hard on the road surface, especially in warm weather.
   _____C. It increases the chance of being driven into the oncoming lane of traffic if struck from the rear.
   _____D. It detracts from your ability to see the oncoming traffic.

6. When two cars approach an unmarked intersection at the same time, who has the right-of-way?
   _____A. Car on the left.
   _____B. Car on the right.
   _____C. The first car at the intersection.
   _____D. All the above.

Pre/Post Assessment Answers
Intersections

1. A
2. B
3. E
4. A
5. C
6. B

Appropriate Instructional Materials
Intersections

Filmstrip: "Intersection Maneuvers," 5 filmstrips, Ford Motor Co., and Bumpa-Tel.

Textbook References

Drive Right.
pp. 106-113

Driving and Traffic Safety.
pp. 64-65, 71, 147-152, 195-197

Driving: A Task Analysis Approach.
pp. 32, 111, 113-114, 121, 162-163, 165, 167-168

In the Driver's Seat.
pp.107, 181, 187-189, 208-209

Learning to Drive: Skills, Concepts, and Strategies.
pp. 89, 139-150, 176, 178-179

Safe Performance Driving.
pp. 68-70, 84-87, 123, 126-129, 134-135, 422

Sportsmanlike Driving.
pp. 51-52, 319

Tomorrow's Drivers.
pp. 97-107

Unit B: Interacting With Other Highway Users

5.0 Pedestrians and Animals

Principle: The majority of urban traffic fatalities occur to pedestrians. This is so not because the number of vehicle-pedestrian accidents exceed vehicle-vehicle collisions, but rather because vehicle-pedestrian accidents are more likely to be fatal. Pedestrians are highly vulnerable.

Up to now, traffic education students have been, for the most part, in the role of pedestrians interacting with motor vehicle operators. Now they will be changing roles frequently between vehicle operator and pedestrian. (A person who just parked the vehicle is a pedestrian.) Since students have received considerable pedestrian education prior to traffic education, the emphasis here will be from the perspective of the operator, to improve perceptual skills and judgment with respect to pedestrians. However, students will be reminded that pedestrians bear legal and moral responsibilities, and that cooperation between all highway users is most desirable.

Since accident facts remind us that animals along the highway present drivers with a problem similar to the pedestrian—both pedestrians and animals are maneuverable and unpredictable—animals are also included in this concept.

5.1 Crosswalks and Laws

Objectives: Student Behavior: Identify marked and unmarked crosswalks and state what implications they have for driver and pedestrian behavior. The student will be able to explain where the vehicle should stop at a crosswalk.

Learning Activities: Discuss why pedestrians always have the right-of-way when you are the driver.

5.2 Types of Pedestrians

Objectives: Student Behavior: When shown pictures (or word descriptions) of pedestrians in traffic scenes, students will be able to classify pedestrian actions typical of various age groups.

Learning Activities: Discuss why you should be prepared for a ball to come into the street when you see children playing.

5.3 Critical Areas

Objectives/ Student Behavior:	Identify the places or conditions which are particularly critical as far as vehicle operator-pedestrian interaction is concerned, and select appropriate courses of action from given alternatives to minimize the hazard.
Learning Activities:	Discuss the problems presented by joggers, people walking after dark, or delivery trucks stopped in the traffic lane.

5.4 Pedestrian Responsibilities

Objectives/ Student Behavior:	Describe the legal and moral responsibilities of pedestrians.
Learning Activities:	Discuss why we must be better pedestrians than other people are and assume the vehicle always has the right-of-way.

5.5 Animals

Objectives/ Student Behavior:	Indicate why and where animals can be dangerous to the vehicle operator and what can be done to minimize these dangers.
Learning Activities:	Discuss the problems with domestic animals and wild animals and the effect car lights have on them.

Content

5.0 Motorists have the responsibility of taking proper precautions to avoid hitting pedestrians at all times and places, even if they jaywalk.

5.1 Because they are so vulnerable, fragile and without protection, pedestrians have been given the right-of-way over the vehicle at all intersections and at any other point where a crosswalk has been placed. In fact, under no circumstances is the operator of a motor vehicle privileged to exercise the right-of-way over a pedestrian.

A. Usually, intersection crosswalks will be marked, but even if they are not, a pedestrian has the right-of-way from curb-to-curb. (The crosswalk is an extension of the sidewalk at the intersection.)

B. Marked crosswalks may be designated anywhere they are needed.

C. Pedestrians on a crosswalk (unless walking against a red light) have the right-of-way over vehicles.

D. Crosswalks give the pedestrian more protection in some states than in others. One state's Appeal Court ruled that a pedestrian is entitled to as much space as will afford safe passage without such threat of interference that will reasonably cause to stepping back or hesitating.

5.2 If we consider the way a pedestrian looks at vehicular traffic, it will help us to predict pedestrian behavior. Perceptions of pedestrians vary with the individual and change with the age of the person.

A. Since the pedestrian does not need to comply with a licensing law, or meet an age regulation, all kinds and ages of people walk on the streets and highways.

B. Many pedestrians are non-drivers (older people and children), but practically all drivers are pedestrians at some time.

C. You can assume that children, elderly people, non-drivers, or anyone impaired by alcohol or drugs may have deficient judgment.

D. Elderly pedestrians tend to base their judgments on when to cross on the movement of other pedestrians and vehicles, rather than on traffic signals.

E. The speed of an oncoming vehicle (closure rate) is difficult to judge, even for a pedestrian with perfect eyesight and excellent depth perception.

5.3 Operators should be especially alert for pedestrians:

A. around schools, churches, parks, and playgrounds;

B. when children are playing on or near the road (they may dart out or throw objects on the road);

C. at intersections and in mid-block locations where there are department stores on opposite sides of the street;

D. anywhere near a school bus;

E. after dark, almost anywhere;

F. near military installations;

G. while passing parallel parked vehicles and delivery trucks (possibility of people alighting from these vehicles);

H. along any roadway bordered by a solid fence, buildings, or bushes; on school and college campuses;

I. whenever there are people on foot near the roadway; and

J. whenever the weather is bad—wind, cold, rain and snow.

5.4 Although pedestrians have been granted certain protective privileges, they bear certain legal and moral responsibilities in traffic.

A. The pedestrian is expected to cross city streets at crosswalks, if a hazard is created by doing otherwise.

B. At signal controlled intersections, the pedestrian is required to obey the "walk" and "don't walk" signals.

C. The law does not allow the pedestrian to leave the curb suddenly and walk into the path of a car close enough to cause a hazard.

D. If you are the pedestrian and have to walk on a road at night:
1. stay off the traveled portion of the highway;
2. walk toward oncoming cars so that you can see them;
3. wear or carry something that has a light color (below the waist because of headlights), so drivers can see you; and
4. preferably carry a light.

E. While pedestrians are subject to certain laws, they are rarely enforced against them in most cities. (Pedestrian violations have low priority.)

5.5 Animals are especially unpredictable; but if operators are alert for the potential hazard of an animal dashing into their paths without warning, and adjust their speed accordingly, collisions can be avoided.

A. Knowing the habits of deer is one way of helping to reduce the numerous vehicle-deer accidents (estimated over 100,000 deer are killed annually by vehicles).
1. Normal daily movements of deer include crossing highways. (Heed deer crossing signs by reducing speed.)
2. Deer are attracted to roadways for feeding, an activity undertaken chiefly during the hours of darkness. The road shoulder normally offers highly palatable grasses and legumes.
3. One deer often means that more deer are present.
4. It is believed that the shadow behind the animal created by the headlight startles the deer when he moves, so that he bolts out into the path of the vehicle.
5. Many deer will change direction and bounce back across the road when confused. They usually retreat in the direction from which they came.

B. Observation, speed reduction and a state of readiness are the most effective responses for the driver when there is a possibility of an animal threatening his path.
1. Operators need to watch for dogs and cats along the roadside and adjust speed and position to minimize the threat.
2. At night the reflective eyes of an animal are a cue to the operator to be on the alert.

C. Some dogs like to chase motor vehicles. (Operator is usually successful in speeding up to escape from the dog.)

Pre/Post Assessment

Pedestrians and Animals

1. As a pedestrian, you are expected to cross the street in the crosswalk.
   _____True _____False

2. Bright colored clothing and/or carrying a light are good ideas if walking on or across roads at night.
   _____True _____False

3. There are no pedestrian laws; only laws for drivers concerning pedestrians.
   _____True _____False

4. A pedestrian has the right to step into the roadway at any time.
   _____True _____False

5. Young children and the elderly generally exhibit better judgment as pedestrians.
   _____True _____False

6. The place to look for a pedestrian could be just about anywhere.
   _____True _____False

7. If you are driving at night and you see a deer on the edge of the road you should:
   _____A. Flash lights from low to high beam and back again.
   _____B. Honk the horn.
   _____C. Dim the lights and slow down.
   _____D. Turn off your lights for two seconds.

8. When you see an animal in the roadway, you should:
   _____A. Continue at the same rate of speed and honk.
   _____B. Slow down and grip the wheel.
   _____C. Honk the horn and stop.
   _____D. Honk, slow down, and be prepared to stop.

9. A pedestrian has an assumed right-of-way in which of the following?
   _____A. Crosswalks.
   _____B. When the "walk" signal is on.
   _____C. All the time.
   _____D. All of the above.

10. When you are a pedestrian, on which part of a rural roadway should you walk?
    _____A. The same as traffic—the right side.
    _____B. Toward traffic flow, facing oncoming cars.
    _____C. Never walk on the roadway.
    _____D. It does not matter.

11. Which of the following is a major danger for pedestrians at night?
    _____A. It is difficult to see where they are going.
    _____B. Automobile lights temporarily blind them.
    _____C. It is difficult to be seen by drivers.
    _____D. They have no right-of-way at night.

12. Drivers should always be conscious of the fact that pedestrians are:
    _____A. unpredictable.
    _____B. always in the right.
    _____C. often neglectful of traffic.
    _____D. All of the above.

Pre/Post Assessment Answers

Pedestrians and Animals

1. True
2. True
3. False
4. False
5. False
6. True
7. C
8. D
9. D
10. B
11. C
12. D

Textbook References

Pedestrians and Animals

Drive Right.
pp. 19, 110-111, 114-115, 167-171, 179 (1977)
pp. 45-47, 110-113, 126, 135-136, 151 (1982)

Driving and Traffic Safety.
pp. 64-67, 74, 108-115, 149-150, 164, 197, 222

Driving: A Task Analysis Approach.
pp. 31-32, 35, 39

In the Driver's Seat.
pp. 70, 74, 241, 261, 262, 192

Learning to Drive: Skills, Concepts, and Strategies.
pp. 183-185

Safe Performance Driving.
pp. 9, 52, 60, 67-68, 75-77, 81, 90-91, 105-109, 114, 119, 163, 166, 182-185, 194, 219-220, 242-247, 250, 280, 392, 403-407, 416-418, 427

Sportsmanlike Driving.
pp. 230-237, 317

Tomorrow's Drivers.
pp. 56

Unit B: Interacting With Other Highway Users

6.0 Driving Variations

Principle: There are certain skills basic to any driving location or condition. On the other hand, certain areas have additional hazards not found under normal driving conditions. Each area of city, residential, rural and freeway driving presents unique challenges to the driver. Therefore, special care must be exercised in each of these driving environments.

6.1 City Driving

Objectives/ Student Behavior: Students will identify visual limitations that exist in city driving. Students will identify potential hazards found in the city traffic environment. Students will identify five urban driving conflicts and describe methods to reduce their potential danger.

Learning Activities: Group discussion focused upon IPDE (identify, predict, decide, execute) in avoiding possible conflicts. Visibility reduction allows less time for decision making. Discuss the dangers of lane changing, one-way streets, lighting conditions, pedestrians, and alleys in city driving. Complete Learning Guide 41.

6.2 Residential Driving

Objectives/ Student Behavior: Students will be able to list the hazards of residential driving and explain what is necessary to avoid problems with each. The students will list five possible conflicts in residential driving and describe methods to minimize them.

Learning Activities: Discuss the hazards associated with school zones, children playing on or near a street, bicycles, out-of-state cars, hedges or trees, and cars in driveways in residential driving. Complete Learning Guide 42.

6.3 Rural Driving

Objectives/ Student Behavior: Students will identify the violations that cause the most fatalities on rural roads. Students will list and define hazards that are to be found on rural highways and country roads. Students will identify the effect of weather conditions on rural driving.

Learning Activities: Compare statistics on rural and urban accidents. Why do these accidents produce more fatalities in the rural setting? Discuss physical road features and their effect on vehicle control.

6.4 Freeway Driving

Objectives/ Student Behavior: Students will define specific design features of freeways that are different from other roadways and list some advantages. Students will identify various critical segments of freeway driving and develop methods to minimize such problems. Students will define procedures for lane placement and lane changing on freeways. Students will list five potential dangers of freeway driving and provide methods to reduce the potential conflicts.

Learning Activities: Discuss good and bad design features of freeways; vehicle preparation for freeway driving; characteristics of various vehicles on freeways; different types of interchanges found in freeway driving. Study and complete Learning Guides 43 and 44.

Content

6.0 Traffic situations are usually more complex in the city than when driving in small towns. City driving imposes tight quarters.

6.1 Drivers may find unfamiliar hazards in city driving.

A. Hazards that confront a driver in the city might include:
   1. limited visibility;
   2. crosswalks;
   3. increased traffic density;
   4. increased pedestrian density;
   5. limited parking;
   6. one-way streets;
   7. lighting conditions;
   8. alleys;
   9. lane changes;
   10. parked vehicles;
   11. reversible traffic flow lanes; and
   12. bicycle or motorcycle traffic.

B. One element of driving that improves in the city is slower speeds.

C. Areas within the city provide different driving experiences:
   1. commercial areas and
   2. residential areas.

D. Driving in the city demands increased awareness to all aspects of the driving task.
   1. Drivers must maintain sufficient space to see ahead and predict what is happening.
   2. When driving in the city, always have enough room ahead of you to stop or change lanes to avoid hitting another car.

E. Knowing one's destination and using trip planning to determine routes will greatly enhance the city driving experience.

6.2 Residential areas have some things unique to no other driving experience.

A. Generally, there is not a problem with traffic congestion.

B. There are several areas of concern for drivers:
   1. children playing in or near streets;
   2. school zones with their reduced speed limit requirements;
   3. bicycles being ridden on the street;
   4. out-of-state cars that are not acquainted with area speed limits or driving laws;
   5. hedges, trees, and bushes often obstruct signs, intersections, roadways, and other hazards.

C. The easy-going manner of residential driving can itself be a distraction to an inexperienced driver.

6.3 Rural driving is one of the most dangerous driving areas.

A. Rural driving is most hazardous due to the following physical conditions:
   1. narrow bridges;
   2. culverts;
   3. ditch banks;
   4. sharp curves and steep hills;
   5. unmarked intersections and farm roads;
   6. cattle guards, and
   7. power poles and fence posts.

B. Plant growth can be a problem in country driving including:
   1. shrubbery;
   2. weeds;
   3. crops, and
   4. trees and hedges.

C. Some hazards encountered on country roads might include the following:
   1. stalled vehicles;
   2. school buses;
   3. over-width farm vehicles;
   4. motorcycles;
   5. slow-moving vehicles, and
   6. domestic and wild animals.

D. The design and engineering of rural roadways often contribute to hazardous driving conditions:
   1. width of road;
   2. shoulder area;
   3. design and shape of road surface;
   4. road-shoulder union;
   5. gravel or dirt surface, and
   6. signs not always present or maintained.

E. The hazards of rural roadways may influence a driver in one of the following ways:
   1. reduction in field of vision;
   2. distract driver's attention; and
   3. cause sudden reactions and judgments.

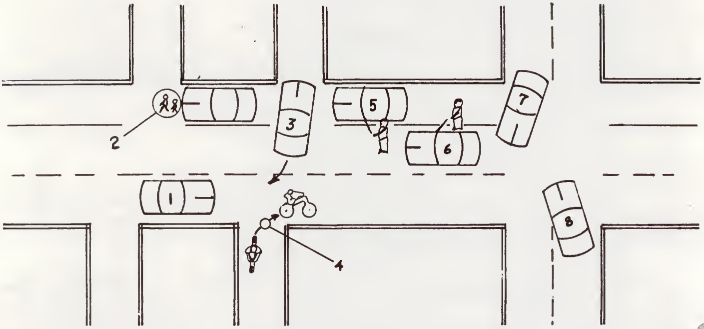
6.4 Freeway driving, while being protected from intersections, generates its own hazards through increased speed.

A. Freeways eliminate many driving problems due to the following features:
   1. controlled access;
   2. overpasses and underpasses;
   3. center dividing strips;
   4. minimum stop signs and lights;
   5. wide lanes;
   6. good road surface;
   7. minimal distractions;
   8. acceleration lane; and
   9. rest stops.

B. Some potential hazards of the freeway might include:
   1. excessive speed;
   2. merging lanes;
   3. signs that distract or confuse;
   4. improper following distances;
   5. lane selection;
   6. boredom or highway hypnosis;
   7. various types of vehicles; and
   8. unfamiliar intersections such as cloverleaf, diamond, etc.

Learning Guide 41

Residential Hazard Recognition

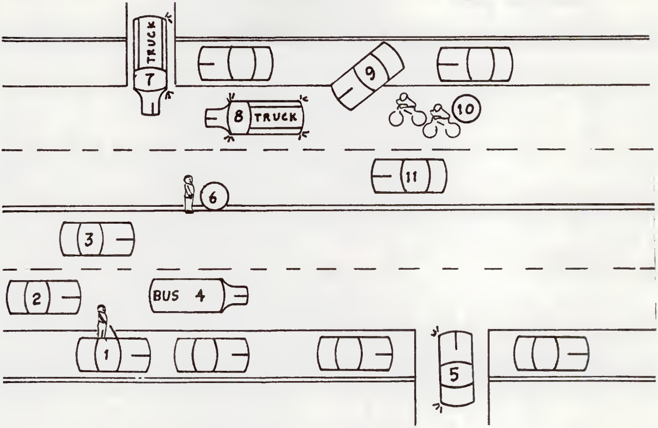


What possible dangers might each numbered driver or person expect in this residential situation?

1. Driver ____________________
2. Children ____________________
3. Driver ____________________
4. Bicyclist ____________________
5. Driver ____________________
6. Driver ____________________
7. Driver ____________________
8. Driver ____________________

Learning Guide 42

Urban Hazard Recognition



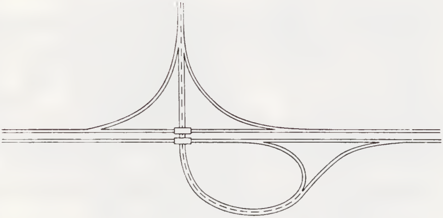
In this urban situation, what possible dangers should each driver expect?

1. Pedestrian ______
2. Driver ______
3. Driver ______
4. Driver ______
5. Driver ______
6. Pedestrian ______
7. Driver ______
8. Driver ______
9. Driver ______
10. Cyclists ______
11. Driver ______

Learning Guide 43

Freeway Ingress and Egress

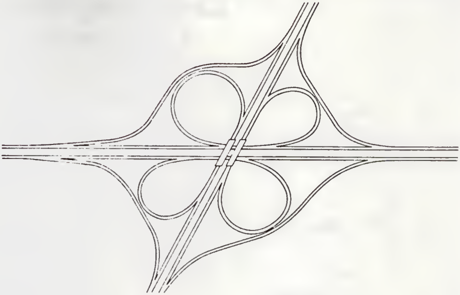
What possible problems would each of the following *interchanges* present to a driver in terms of entering and exiting?



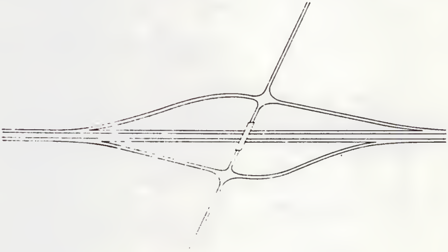
Trumpet
Interchange

Two-Quadrant
Partial-Cloverleaf
Interchange

What possible problems would each of the following *interchanges* present to a driver in terms of entering and exiting?



Cloverleaf
Interchange



Diamond
Interchange

Learning Guide 44

Entering a Multi-Lane Road

Task	Rationale
1. Visual search	Visually check traffic to the rear and approaching traffic in lane you wish to enter to avoid possible traffic conflicts.
2. Signal (left)	To communicate to driver following your vehicle your intention to change lanes to avoid possible interruption of traffic flow.
3. Accelerate	Adjust vehicle speed to speed of traffic in lane you have entered. Avoid, if possible, interruption of moving traffic.
4. Signal (cancel)	Signal must be cancelled to avoid confusing drivers following your vehicle as to your intention of an additional maneuver.

Exiting from a Multi-Lane Road

Task	Rationale
1. Visual search	Visually check traffic to the rear and ahead to insure that your anticipated maneuver will not cause traffic conflicts.
2. Signal (right)	To communicate to the driver following your vehicle your intention to change lanes.
3. Exit	Gradually turn right to leave the interstate highway.
4. Decelerate	To posted speed of deceleration lane to avoid traffic conflicts.
5. Signal (cancel)	To avoid confusing following traffic.

Pre/Post Assessment

Driving Variations

1. We should always drive at a constant speed in rural and mountain areas.
   _____True _____False

2. The most common accident that occurs on freeways is
   _____A. head-on collisions.
   _____B. side-swipes.
   _____C. rear-end collisions.
   _____D. single car accidents.

3. What is the desired speed when entering a freeway?
   _____A. Maintain freeway speed.
   _____B. Slow to near stop.
   _____C. Enter a little faster than the limit.

4. The major contributor of freeway accidents is
   _____A. speed.
   _____B . merging traffic.
   _____C. wet roadways.
   _____D. the other person.

5. What is a factor that produces more deaths on rural roads than on urban roads?
   _____A. Not being found shortly after the accident.
   _____B . Not getting immediate medical attention.
   _____D. The wait for the emergency vehicle.
   _____D. All of the above.

6. Freeways cut down on accidents by
   _____A. eliminating left turns.
   _____B. limiting access.
   _____C. providing rest areas.
   _____D. providing acceleration lanes.
   _____E. All of the above.

7. When you see a car parked in a driveway, what should you look for?
   _____A. A bicycle in the driveway.
   _____B. A child in the yard.
   _____C. A driver in the car.
   _____D. A driver coming from the garage.

8. Which area of the driving environment has a higher fatality rate per accident?
_____A. Rural.
_____B. Residential.
_____C. City.
_____D. Freeway.

9. Which hazards might you encounter on rural roads?
_____A. Slow-moving machinery.
_____B. Livestock on the roadway.
_____C. Blind curves.
_____D. All of the above.

10. "Expect the unexpected" is a good rule when driving:
_____A. in rural situations.
_____B. in city traffic.
_____C. on the freeway.
_____D. in residential areas.
_____E. at all times.

11. On what kinds of rural roads do most motor vehicle deaths occur?
_____A. Straight roads.
_____B. Curved roads.
_____C. Hilly roads.
_____D. Steep, mountain roads.

12. When approaching a double-parked delivery truck, you should be on the look-out for:
_____A. Boxes falling out of the truck.
_____B. Car on curb in front of truck.
_____C. Driver getting out of truck.

13. What is the most complicated maneuver in city traffic?
_____A. Turning left at an intersection.
_____B. Following.
_____C. Lane change.
_____D. Turning right at an intersection.

14. City driving is more complex because of:
_____A. number of cars.
_____B. pedestrians.
_____C. reduced visibility.
_____D. All of the above.

15. The most dangerous type of roadways are:
_____A. residential streets.
_____B. business thoroughfares.
_____C. rural roads and highways.
_____D. expressways.
_____E. All of the above.

Pre/Post Assessment Answers

Driving Variations

1. False
2. C
3. A
4. A
5. D
6. E
7. C
8. A
9. D
10. E
11. A
12. C
13. A
14. D
15. C

Appropriate Instructional Materials
Driving Variations

Films:

"Freeway Phobia," Montana State Film Library, No. 6154 and No. 7821.

Slides:

"Let's Make Expressways Safe Ways," National Safety Council.
"City Driving," National Safety Council, 444 No. Michigan Ave., Chicago, IL 60611.

Filmstrips:

"They Can't Stop," "Perceiving and Reacting in Traffic," "Accident Free City Driving." Bumpa-Tel.
Ford Time Lapse Filmstrips. "Intersection Maneuvers," (kit of 5).
"Perception of Driving Hazards," Shell Oil Co., Public Relations Manager, P.O. Box 2463, Houston, TX 77001 (free).

Current Montana Highway Patrol Annual Report, Montana Highway Patrol, Helena, MT 59620.

"Driving Strategies for Rural Highways," Bumpa Tel, Inc., P.O. Box 611, Cape Girardeau, MO 63701.

"Accident Facts," Yearly publication, Travelers Ins. Co., 3 Constitution Plaza, Hartford, CT 06115 (free.)

Textbook References

Drive Right.
pp. 148, 156-171, 177-213 (1977)
pp. 118-140, 142-164, 166-188 (1982)

Driver Education and Traffic Safety.
pp. 60-94, 192-206, 315-317

Driving: A Task Analysis Approach.
pp. 7, 9, 30-31, 37-46, 78-82, 103, 116, 123, 134-136, 137-139, 144, 162-166, 167, 233

Driving With Car Control.
pp. 112-130

In the Driver's Seat.
pp. 150-151, 178-191, 201-202, 212-217, 270-277

Learning to Drive: Skills, Concepts, and Strategies.
pp. 81-109, 115-130, 131-151, 187-199

Safe Performance Driving.
pp. 51-57, 62-70, 83-87, 99-102, 104, 106-107, 118-140, 163-170, 184-185, 216, 226-229, 232-237, 243-256

Sportsmanlike Driving.
pp. 51-53, 59-61, 66-79, 111-113, 154-155, 160-162, 197-199, 230-237, 319

Tomorrow's Drivers.
pp. 112-124

Unit C:
Critical Situations

Unit C: Critical Situations

Concepts:

1.0	Control of Vehicle
2.0	Adverse Weather Driving

Content

Learning Guides

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit C: Critical Situations

1.0 Control of Vehicle

Principle: This concept is designed to prepare students to maintain vehicle-roadway stability under adverse surface conditions, during emergency stops, and when critical situations "triggered" by vehicle malfunction occur unexpectedly. Drivers should be mentally prepared for such events so that the surprise of the event does not produce panic.

1.1 Traction Loss

Objectives: Student Behavior: Student will identify the causes which result in loss of traction and will define the procedures to compensate for loss of traction (overacceleration, overbraking, turns and curves, unequal traction, slippery road surfaces).

Learning Activities: Discuss preventive measures to minimize traction loss of vehicle. Discuss how to correct for each type of traction loss. Study and complete Learning Guide 45.

1.2 Vehicle Malfunctions

Objectives/ Student Behavior: Student will identify possible critical situations and the response to such conditions. The student will be able to identify the necessary steps to minimize vehicle malfunctions. Student will identify specific vehicle malfunctions and describe proper corrective actions.

Learning Activities: Develop procedural guides for selected vehicle malfunctions such as tire failure, stalled engine, overheated engine, out of gas, brake failure, headlight failure, stuck accelerator, hood flies up, or wheels off pavement. Study and complete Learning Guides 46 and 47.

Content

1.0 When tires lose their rolling grip (traction) on the pavement, the result is partial or complete loss of control of the car.

1.1 Traction is lost when your wheels are skidding from overbraking, brake malfunction, or improper use of the shifting lever and the accelerator.

A. When the front wheels lock due to improper brake adjustment, steering is ineffective and rear wheels act as a rudder to keep car going straight ahead. (Release brakes and slow down.)

B. When rear wheels lock, caused by brakes out of adjustment, the back end of the car tries to pass the front end. (Remove foot from brake, slow down and countersteer in the direction of the skid momentum.)

C. When the grip of the brakes or tires is unequal, the car tends to swing or pivot around the wheel where the grip is the strongest.

D. An all-wheel braking skid occurs in a panic stop even with good brakes. To regain traction release brake because you *cannot steer a skidding car when all four wheels are locked.*

E. Overpowering on a curve permits centrifugal effect to take over. Skidding or sliding on turns or curves occurs when the inertia force is greater than the side thrust friction force of your vehicle. The cause is an improper combination of speed and direction change. A constant speed, suitable for conditions (curvature and coefficient of friction) will prevent sliding action on curves.

F. Traction is markedly reduced when your wheels are spinning, the consequence of "overpower," usually on take-off. Slippery surfaces not only reduce traction but greatly influence the control the driver has on the automobile.

G. The skill of starting on a slippery surface lies in applying the power to the drive wheels so that they grip gently and gradually.
   1. For manual transmission, start in second by slipping the clutch.
   2. For automatic transmission, apply gentle acceleration. Automatic transmissions tend to make sudden transmissions of power because slight "windup" of engine is required to make the transmission function.

H. The probability of skidding can be minimized by:
   1. keeping brakes and tires in good condition;
   2. lengthening sight distance and reacting to developing hazards well in advance;
   3. matching vehicle speed to road conditions;
   4. smooth and gradual speed control, tracking and braking (avoid overpowering, oversteering and overbraking);
   5. periodically checking the "feel" of slippery surface by gently applying the brakes when there is no traffic near; and
   6. staying off the highway when road surface conditions are extremely hazardous.

I. To regain traction and return the vehicle to its normal course when the rear end of the car slides around steer in the direction of the skid only far enough to point the front wheels in the direction you want to go (overcorrection can cause a skid in the other direction).

1.2 When a sudden vehicle malfunction occurs, particularly to one of the basic control devices, the operator's skills and emotions are tested.

A. Brake failure or malfunction results from:
   1. a leak in any part of the hydraulic brake system—affects all four wheels equally (sinking brake pedal);
   2. loss of friction between the drum/calliper and the lining/disc due to overheating (fading brake pedal) or, in the case of an old car, the brakes may get wet;
   3. air trapped in the brake lining system, or twisted or worn brake hose (spongy brake pedal); and
   4. breakdown of some mechanical linkage within the system.

B. When brakes fail:
   1. pump the brake pedal in an attempt to build up pressure and restore braking action long enough to get off the road;
   2. if that action does not suffice, set the parking brake with a slow steady pressure; at the same time hold release lever in "off" position to prevent brake lock-up that could cause the vehicle to skid out of control;
   3. downshift to permit engine braking to help reduce speed;
   4. find an escape route—a safe exit from the highway; and
   5. while struggling to maintain steering and speed control, communicate your emergency situation to other highway users threatened by the situation (sound horn, flash lights).

C. In extreme cases it may be necessary to slow the vehicle by:
   1. running along an embankment;
   2. scraping against a curb;
   3. driving into bushes, hedges, or snowbank; or
   4. sideswiping a row of parked cars.

D. If loss of braking power or uneven action results from wet brakes, dry them quickly by:
   1. staying in low gear and pumping gently; or
   2. applying slight pressure on accelerator while brakes are being applied with the left foot. (This technique can also be used after driving through water to dry wet brakes.)

E. If you have power steering and the power fails, you can still gain control by gripping harder and steering more firmly.
   1. If something has gone wrong with the steering linkage, all you can hope to do is stop as quickly and safely as possible.

F. When a tire blows out:
   1. if a front tire blows out, the front wheels tend to be pulled in the direction of the blowout.
   2. if a rear tire blows out, the rear of the car may swerve or sway violently.
   3. promptly firm your grip on the steering wheel and apply whatever steering input is required to hold a straight course.
   4. ease up on the accelerator, allowing engine braking to slow the car.
   5. brake with a firm, steady pressure, avoiding wheel lock-up.
   6. look for an escape route when the vehicle is under control, and drive *entirely* off the road to a level spot where you can change the tire in safety, even though you may ruin the tire.
   7. set the parking brake to the maximum tension and move the selector lever to PARK (manual shift car, place the gear in reverse or low).

G. A tire emergency does not end with getting the car stopped, because you have either to call for help or change the tire. Directions for use of the jack usually are mounted on the inside of the trunk lid.

H. When the accelerator pedal sticks, power must be cut off the drive wheels.
   1. Immediately place the gearshift lever in neutral, apply brakes, pull off the road where the pedal can be safely released, and turn off the ignition. (Try to find and remedy the trouble.)
   2. In a manual shift car, depressing the clutch will serve to disengage the power from the drive wheels.
   3. If the vehicle does not have power brakes or steering, turning off the ignition first is an alternative technique.

I. Even with careful maintenance, a critical situation involving headlight failure may arise. Sometimes you will be able to bring them back temporarily by hitting the dimmer switch. If not, perform the following steps:
   1. slow down quickly, keep the car in its path, and look for an escape route;
   2. as you slow down, watch for anything that can help orient you;
   3. try the parking lights, or any auxiliary lights on the car (spotlights or fog lights);
   4. flash the brake lights, and turn on the right turn signal.

J. If the hood flies up while driving, it is somewhat like having a curtain drawn in front of your face.
   1. Look under the center of the opened hood, or out of the left window, steer carefully off the road and stop.
   2. To prevent this situation from happening, check to see that the hood is properly closed after you or a service station attendant has opened it.
   3. If hood vibrates as you drive, stop immediately and make sure that it is closed properly.
   4. If this situation has occurred, make sure the safety latch is operative before proceeding.

K. When the engine stalls during movement:
   1. Usually it can be re-started by placing the selector lever in neutral (clutch down in manual transmission) and turning the starter switch while the car is moving;
   2. An alternative in a manual shift car is clutch down, gear shift lever in second and clutch out slowly;
   3. If these techniques are unsuccessful, look for the first opportunity to signal; drift off the roadway and stop.

L. If engine overheating occurs, as revealed by the temperature light or gauge:
   1. Pull off the road, place shift lever in neutral, and run engine at a fast idle to circulate water and cool it;
   2. Watch the temperature indicator (if temperature reduction is not quickly apparent, stop the engine);
   3. Raise hood but do not remove radiator cap (wait for engine to cool; examine for external leaks, broken fan belt or anything that might slow the movement of the coolant or air);
   4. When system cools, remove cap carefully and check coolant level (if near normal and there is no rusting, apparently trouble is mechanical); and
   5. If service station is nearby and the system has cooled, drive slowly (or have the car towed). The trouble may be with the water pump or the thermostat.
   6. If fire breaks out under the hood, use a dry chemical fire extinguisher. If a fire extinguisher is not available, try to smother the fire with a blanket. If the fire is out of control, get at least 50 feet from the vehicle; the gas tank can explode.

M. Sooner or later almost every driver has the experience of running out of gas.
   1. If the vehicle fails on the traveled part of the road, make every reasonable effort to get it off the roadway by coasting, pushing, or using the starter in a manual transmission. If you are unsuccessful, turn on the warning flashers to protect the scene or tie something white to the door or antenna (raise the hood and trunk); then seek help.
   2. At night use your emergency turn signal switch, turn on your dome light, and place emergency flare or lights if you have them.
   3. As a signal to passing motorists that you are in trouble, particularly on a controlled access highway, raise the car hood and tie a white cloth to the left-hand door handle or antenna.
   4. In isolated areas, stay in the car, locked and closed up, and wait for the police. (Wave strangers by and tell them help is on the way.)

N. When one or two wheels drop off the edge of the pavement, unequal braking and steering result.
   1. A firm grip on the steering wheel is necessary to keep the car traveling straight ahead, straddling the pavement edge. (Fight the tendency of the wheel to pull right.)
   2. The driver must resist any immediate urge to whip the car back onto the pavement.
   3. By easing off the accelerator the motor will slow the vehicle down gradually.
   4. If braking seems necessary, a gentle squeeze enables the driver to maintain control.
   5. A thorough visual check ahead, to the side, and to the rear is essential before returning to the roadway.
   6. After speed has been reduced, the wheels can be turned sharply (depending on the shoulder drop), permitting the vehicle to climb the pavement edge.

Learning Guide 45

Traction Loss

Correcting a serious skid to the right on an icy road

A. Ease up on the accelerator.

B. Turn steering wheel quickly to right until skid stops.

C. When car begins to counter-skid to the left, return the steering wheel quickly.

D. Always try to keep the steering wheel pointing in the direction you want to travel.

E. Turn steering wheel gently to the right to compensate for any counter-skid.

F. Proceed directly ahead as the car straightens.

Overacceleration:
Driver attempts to start too quickly from a stopped position.
Correction:
Let up on the accelerator until the drive wheels stop spinning and traction is regained.

Overbraking:
Brakes are applied too heavily.
Correction:
Release brakes completely.

Turns and Curves:
Improper combination of speed and direction change can cause conflict.
Correction:
Constant speed suitable for conditions.

Unequal Traction:
Due to pavement conditions, improperly adjusted brakes, or a blowout.
Correction:
Countersteering to maintain directional control.

Learning Guide 46

Emergencies

Tire Failure

In the event a tire on your car should blow out, the following procedure should be used:

A. Grip the steering wheel firmly and apply whatever pressure necessary to hold a straight course.
B. Ease your foot from the accelerator and allow the engine to brake the car slowly.
C. Squeeze the brakes carefully. Be sure not to lock them.
D. When you have the car under control, look for an escape route entirely off the highway—preferably a flat spot where the tire can be changed.
E. Set the parking brake at maximum tension and put the gear shift selector in PARK (manual transmission use reverse or low).

Stalled Engine

If the engine of your car stalls while you are moving down the highway, the following procedure should be used:

A. Place gear shift selector in neutral and turn the starter switch while the car is still moving.
B. If this is unsuccessful, signal and turn off the road at the first opportunity.

Overheated Engine

If the temperature gauge or light indicates that the engine is overheating, the following procedure should be used:

A. Signal and pull off the road. Place the shift selector in PARK and run the engine at fast idle to circulate the water and cool it.
B. Watch temperature gauge; if temperature goes down, continue. If not, stop the engine.
C. Raise the hood but do not remove the radiator cap. Wait for the engine to cool. While waiting, check for external leaks, broken fan belt or anything that might slow the coolant or air.
D. When the system cools, remove the radiator cap carefully and check water level. If the water level is near normal and there is no rusting, then the trouble is probably mechanical.
E. When the system is cool, drive slowly to the nearest service station or have the car towed.

Steering Failure

If the steering on your car should fail, the following procedure should be used:

A. If you have power steering and the power fails, you can still gain control by gripping harder and steering more firmly. There are some who may not be able to do this, especially on curves.
B. If something has gone wrong with the steering linkage, all you can hope to do is stop as quickly and safely as possible.

Brake Failure

If the brakes should fail on your car while you are driving, the following procedure should be used:

A. Pump the brake pedal in an attempt to build up pressure and restore braking action long enough to get off the road.
B. If that does not work, set the parking brake with a slow steady pressure. At the same time hold the brake release lever in "off" position to prevent brake lock-up which could cause the vehicle to skid out of control.
C. Find a safe place to exit, signal if you can, and get off the highway.
D. While struggling to maintain steering and speed control, communicate your emergency situation to other drivers threatened by the situation (sound horn and flash lights).

In extreme cases it may be necessary to slow the vehicle by:

A. Running along an embankment.
B. Scraping against a curb.
C. Driving into bushes, hedges, or snowbank.
D. Sideswiping a row of parked cars.

Headlight Failure

If the headlights on your car should fail while you are driving, the following procedure should be used:

A. Slow down quickly, keep the car in its path and look for an escape route.
B. As you slow down, watch for anything that can help orient you. Try the dimmer switch.
C. Try the parking lights or any other auxiliary lights on the car (spotlights or fog lights).
D. Flash the brake lights and turn on the right turn signal.

Stuck Accelerator

If the accelerator should stick while you are driving your car, the following procedure should be used:

A. Immediately turn off the key, begin braking, signal and turn off the road where the pedal can be released safely.
B. NOTE: In a car with power steering and power brakes, it will be harder to steer and brake the car.

Hood Flies Up

If the hood of your car should fly up while you are driving, the following procedure should be used:

A. Look under the center of the opened hood or out of the left window; signal and steer carefully off the road.
B. To prevent this situation, check to see that the hood is properly closed after you or a service station attendant has opened it.
C. If the hood vibrates as you drive, stop immediately and make sure it is closed properly.
D. If the situation has occurred, make sure the safety latch is operative before proceeding.

Learning Guide 47

Hazards

Hazard	Driver Action
1. Truck ahead is braking hard; your brakes do not hold.	
2. Road narrows ahead; hill steepens; road bends to right out of sight.	
3. Intersection, traffic slows, your brakes do not hold.	
4. Car pulls hard to right, feels like flat right front tire.	
5. Bumping at left rear, car swerves right; then pulls hard to left.	
6. Right rear tire blows; car tilts right, swerves strongly right.	
7. Steering suddenly stiff to left.	
8. Overtaking car cuts in, braking hard. You brake hard, skid to left.	
9. Suddenly your steering is very stiff and heavy.	
10. Accelerator sticks; car begins to swerve on snow.	
11. Your headlights suddenly fail.	
12. Accelerator sticks.	
13. At night, a sharp curve suddenly appears.	

Hazard	Driver Action
14. You are driving in the rain; your car skids left.	
15. At night, a car suddenly approaches with headlights glaring; you can't see.	
16. You are driving and your lights go out.	
17. At 50 mph your car hits deep water.	
18. You are rounding a mountain curve and a car is approaching in your lane.	
19. At 50 mph you suddenly notice a car tailgating.	
20. At 50 mph a car passes too close and you are forced off the road.	
21. Submerging car, self-rescue.	
22. Accident is imminent and unavoidable.	
23. Bee in car.	
24. Obstructed vision.	
25. Loss of oil pressure.	
26. Gas line freeze-up.	
27. Meeting a snowplow.	
28. Car overheats.	
29. Windshield wipers quit.	
30. Locked yourself out of the car.	
31. Your door lock freezes in the winter.	
32. Fire inside car going 50 mph on a freeway.	
33. Horn sticks.	

Hazard	Driver Action
34. Emergency highway stop.	
35. Encounter heavy fog while going 50 mph.	
36. Suddenly encounter a washed out area of the road.	
37. An accident 100 feet ahead; you are traveling at 50 mph.	
38. You are a passenger and the driver has a heart attack.	
39. Engine stalls at 50 mph on a freeway.	
40. Engine stalls in heavy traffic on a downgrade in town.	
41. A car is approaching you from the rear and is going to hit you.	
42. Your car suddenly goes into a skid on a wet road.	
43. Your wheel goes off the pavement onto the shoulder at 60 mph.	
44. Hood flies up; you are traveling 60 mph.	
45. Car is approaching and is weaving back and forth across the center line.	
46. You are stuck in the snow.	
47. Your steering fails.	
48. Car stalls on a railroad crossing.	
49. Car catches on fire.	
50. You flood your engine.	
51. On a 2-lane highway, a car suddenly pulls out of a side road into your lane.	

Pre/Post Assessment

Control of Vehicle

1. When your engine becomes extremely hot, you should:
   _____A. Shut engine off, let it cool and then add water with the engine running.
   _____B. Put cold water in as soon as possible without allowing it to become wet on the outside.
   _____C. Drain the hot water out completely and replace it with cold water.
   _____D. Open the hood and pour cold water on the engine to cool it quickly.

2. If your right wheels go off onto a soft shoulder, you should:
   _____A. Accelerate slightly.
   _____B. Steer immediately to the left.
   _____C. Get all four wheels on the shoulder.
   _____D. Hold the steering wheel firmly and slow down.

3. Why do wet roads reduce traction?
   _____A. Rubber tires absorb water.
   _____B. Generally, road surfaces absorb water.
   _____C. Rubber tires do not absorb water.
   _____D. Water acts as a lubricant to reduce friction.

4. What should a driver do if the car's right-hand wheels run off the paved surface?
   _____A. Edge back gradually by driving nearly parallel to the pavement edge.
   _____B. Jerk the car back at high speed.
   _____C. Drive straight ahead while slowing down; then cut wheels sharply to the left.
   _____D. Drive completely off the road; then edge back gradually.

5. Which will **most** likely cause you to lose traction on a slippery road?
   _____A. Applying and releasing the brake pedal in succession.
   _____B. Keeping the car pulling steadily at reduced speed.
   _____C. Continuous shifting of conventional gears.
   _____D. Sudden deceleration before shifting gears.

6. Skidding caused by application of the brakes can occur:
   _____A. On any surface, wet or dry.
   _____B. Only on wet surfaces.
   _____C. Only on snowy or icy roads.
   _____D. Only if tires are smooth.

7. When a car is hydroplaning:
   _____A. The tires ride on top of a film of water.
   _____B. The tires travel on a level plane.
   _____C. Friction is reduced about 50 percent.
   _____D. Friction is increased.

8. What should you do if your hood pops up while you are driving?
   _____A. Look through windshield under hood to steer.
   _____B. Brake to a stop.
   _____C. Open window and stick your head outside to see properly.
   _____D. None of the above.

9. If weather conditions are foggy and you must drive, you should:
   _____A. Place lights on high beam.
   _____B. Place lights on !ow beam.
   _____C. Use the shoulder of the road as a reference point.
   _____D. None of the above.

10. When a car is sliding or skidding you should:
   _____A. Hit the brakes.
   _____B. Steer in the direction of the skid.
   _____C. Put the car in reverse.

11. If a blowout should occur while you are driving down the highway, you should:
   _____A. Slam on the brakes.
   _____B. Keep control of the car without using the brakes and allow the engine to slow down the car.
   _____C. Neither of these.

12. Which of the following is not a symptom of failing brakes?
   _____A. Hard pressure on the brake pedal causes the brakes to lock.
   _____B. Continuous hard pressure on the brake pedal causes the pedal to go slowly to the floor.
   _____C. The car pulls to the left or right when the brakes are applied.
   _____D. The pedal goes to within an inch or two of the floor.

13. If the engine stops and your car has power brakes:
   _____A. the operation of the foot brake is not affected.
   _____B. you still have brakes but you must push much harder.
   _____C. you do not have any brakes.
   _____D. the efficiency of both the park and foot brakes is affected.

14. If the rear end of your car skids to the right, you should:
   _____A. Apply the brakes lightly.
   _____B. Turn the steering wheel quickly to the right.
   _____C. Steer straight ahead.
   _____D. Turn the steering wheel to the left.

Pre/Post Assessment Answers

Control of Vechicle

1.	A	8.	A
2.	D	9.	B and C
3.	D	10.	B
4.	C	11.	B
5.	C	12.	A
6.	A	13.	B
7.	A	14.	B

Appropriate Instructional Materials
Control of Vehicle

"Emergency Maneuvers," 4 filmstrips, Ford Motor Co., and Bumpa-Tel.

"Perception of Driving Hazards," filmstrip, Shell Oil Co., Public Relations Manager, P.O. Box 2463, Houston, TX 77001 (free).

"Will You Make the Best Decision?" Liberty Mutual Insurance Co., 175 Berkeley St., Boston, MA 02117 (free).

"How to Handle Driving Emergencies," Highway Users Federation for Safety and Mobility, 1776 Massachusetts Ave., NW, Washington, D.C. 20036.

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pp. 103, 120-153, 171-179, 283-284

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pp. 126, 149, 163-164, 183

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pp. 209-219, 228-229

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pp. 154-156, 188, 306-336, 339-343

Sportsmanlike Driving.
pp. 110, 225-267

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pp. 80, 138-141, 145-148

Unit C: Critical Situations

2.0 Adverse Weather Driving

Principle: Driving in adverse weather is associated with reduced traction and visibility. Snow, ice and mud will make a roadway slippery. Strong winds can exert a great force on a vehicle. Fog will greatly reduce a driver's visibility. Caution and a reduction of speed are in order when driving in these conditions.

2.1 Snow, Ice and Mud

Objectives/ Student Behavior: The student will be able to describe how snow, ice and mud can reduce traction and list ways to compensate for this loss of traction.

Learning Activities: Discuss why snow is more slippery as the temperature increases. Discuss the pros and cons of snow tires, studded tires and chains on snow and ice. Study Learning Guide 48.

2.2 Rain

Objectives/ Student Behavior: The student will be able to describe hydroplaning and how to prevent it.

Learning Activities: Discuss the relationship between tire design and hydroplaning.

2.3 Wind

Objectives/ Student Behavior: The student will be able to describe the effects wind has on a vehicle. The student will be able to list locations on the roadway where winds will be the strongest.

Learning Activities: Discuss vehicle profile and its relationship to wind resistance.

2.4 Fog

Objectives/ Student Behavior: The student will be able to describe the problems of driving in a fog, and how to compensate for those problems.

Learning Activities: Discuss why low beam lights and fog lights are better for foggy conditions.

Content

2.0 Adverse driving conditions frequently involve coping with snow, ice, rain, fog and high winds.

2.1 Snow and ice or a muddy roadway reduce traction. This loss of traction must be compensated for by other measures.

A. The major problem on slippery roads is a sudden change in direction or fast acceleration.

B. Certain measures can be taken before driving to improve traction.
   1. Put extra weight in the back seat (weight is needed in front of the rear wheels if rear drive).
   2. Use snow tires.
   3. Use chains.

C. When driving on slick surfaces, the following measures would be beneficial:
   1. Drive slowly.
   2. Increase your space cushion.
   3. Try to maintain your speed.

D. With know-how and proper equipment, an operator can extricate the vehicle if it becomes mired in snow, mud or sand.
   1. The most effective means of moving a vehicle mired in snow or mud is to provide better friction between the drive wheel tires and the surface by spreading sand, cinders, an old piece of carpeting, traction mats, pieces of brush, or anything else that increases friction.
   2. Sometimes the process of "rocking" the vehicle, skillfully, will be the solution (a questionable practice in an automatic shift vehicle).

E. When you are stopped on two different surfaces, one rear wheel may encounter less resistance to turning than the other—one spins while the other does nothing.
   1. On most vehicles if one wheel spins, the car is just as stuck as though both were spinning.
   2. Some cars now have a limited-slip differential system that forces both wheels to turn, even though one has very little traction.
   3. If the vehicle has front-wheel drive, then traction is required under the front wheels to move the car.
   4. Vehicles with four-wheel drive have a considerable advantage in maintaining traction.

F. To reduce the probability of becoming stuck in mud, snow or sand:
   1. Make every effort to keep moving (shift into second or low gear before entering this section of roadway);
   2. Gain speed before attempting to turn (avoid sharp turns); and
   3. Try to avoid driving in deep ruts (look for solid ground in the center of the roadway or on the shoulder, or straddle the ruts.

G. If engine stalls in a snowbank, open the car windows and shovel the snow away from the exhaust pipe before trying to extricate the car to prevent the danger of carbon monoxide poisoning.

H. Winter driving imposes numerous driving conditions to which a driver must adjust.
   1. Watch for ice patches on that part of the road located in the shade.
   2. Ice and snow surfaces are not always uniform (rough versus smooth, dry versus wet).
   3. Ice freezes more quickly on overpasses and bridges.

I. Temperature will affect the traction on ice and snow.
   1. Freezing rain glazes the highway with a layer of ice.
   2. Ice at 32° is more slippery than ice at 0°.
   3. Ice covered with a thin layer of melted snow is very slippery.

2.2 The right mix of speed, fluid on the road surface and tire tread can result in a vehicle losing all contact with the road and, therefore, loss of traction (hydroplaning).

A. As speed increases on wet road surface, a wedge of fluid builds up at point of contact between the tires and road until the tires begin to ride on (plane) the film of water. Usually the operator has no warning of when the critical speed has been reached until a change in speed or direction throws the vehicle out of control.
   1. At 30 mph or less, tires with tread will cut through the water and remain in complete contact with road.
   2. At 30 to 55 mph, water wedge may penetrate tire/road contact and partial hydroplaning results.
   3. At 55 mph or more, water wedge may increase and tires lose complete contact with road.

B. Besides speed, whether or not hydroplaning occurs depends on the depth of water on the road surface, depth and design of tire tread, tire pressure, wheel alignment and road surface.
   1. Tires with open treading (outlet for fluid) plus siping (small cuts in the tread) tend to push the water out of the way in a squeegee action.
   2. Properly inflated tires with good tread can cut better into a film of water on the road surface, and prevent a "space pocket" from forming under the tires.
   3. The deeper the surface fluid, the more likely that the water will choke the open spaces in the tire tread.
   4. A form of hydroplaning can result from ordinary road film lubricated by a little moisture (happens the first five minutes of a rainstorm, or fog and dew can provide the needed moisture).
   5. Improvements in road surfaces (grooving) and tire design will help to reduce the hydroplaning hazard.

C. To prevent and respond to hydroplaning:
   1. Drive with well-treaded tires, properly inflated;
   2. Reduce speed below hydroplaning speed particularly when approaching curves or other changes in pitch or incline in the road;
   3. If hydroplaning should occur, decelerate and wait for tires to regain traction; and
   4. Drive in the tracks of other vehicles.

2.3 Driving conditions are always difficult when high winds blow.

A. Steering and speed adjustments are necessary when driving in windy conditions.
   1. A head-on wind will reduce your speed and require more fuel.
   2. Tailwinds will push the vehicle.

B. Crosswinds are the major threat to vehicles. Be especially prepared for sudden gusts of wind when exiting from canyons, topping hills or driving through large cuts in embankments.

C. The effects of the wind are partly determined by vehicle profile.
   1. The lower the vehicle, the greater its wind resistance.
   2. Light vehicles have poor wind resistance.

D. Drivers can avoid most problems from wind by:
   1. observing wind warning signs;
   2. not driving high profile vehicles in windy weather;
   3. driving at a slower speed especially in those areas where wind gusts are strongest.

E. Strong winds can reduce a driver's visibility.
   1. Dust and sand are easily blown by wind.
   2. Snow can be blown by strong winds, or can be a problem when being passed or meeting other vehicles, especially large trucks.

2.4 Fog is a major problem for drivers because it reduces visibility.

A. Fog can occur in patches that catch the driver unprepared.

B. Fog can change from a light fog to a thick fog in a very short distance.

C. Your speed must be slow enough to enable you to stop within your visibility distance.

D. If you must drive in fog, keep the following points in mind.
   1. Enter the fog cautiously.
   2. Use fog lights if available.
   3. Use headlights on low beam (there is less reflection).
   4. Drive slowly.
   5. If you must stop, pull off the roadway and activate your emergency flashers.

E. Windshield fog-up can reduce your visibility when driving.
   1. Fogging is caused when moisture from your breath condenses on the cold glass surface.
   2. The defroster, or opening the window, should clear up the fogging.
   3. Rear windows need to be defogged since they play a major role in visibility.

Learning Guide 48

Adverse Weather Driving

How to free your car if it becomes stuck in ice, snow or mud:

A. Do not spin wheels.

B. Rock car forward and backward by changing from drive to reverse or from first gear to reverse in standard transmissions.

C. If B fails, use sand or dirt under back wheels and repeat procedure B (rocking motion).

D. If rocking motion fails, use chains.

NOTE: Do not accelerate very hard. It may cause excessive spinning of the wheels.

Hydroplaning: Water build-up on pavement and troughing of roads.
Correction: Release accelerator and countersteer.
Prevention: Travel at reduced speeds on wet roads.

Mud and Sand: Cause loss of movement of automobile.
Correction: Rocking automobile.
Prevention: Keep automobile moving; shift to second or low gear.

Snow and Ice: Affects road surface conditions.
Prevention: Slow down and drive with caution.

Pre/Post Assessment

Adverse Weather Driving

1. The only problem with strong winds is the force exerted on the vehicle.
   _____True _____False

2. Fog lights give off more light than headlights; therefore, they are better for driving.
   _____True _____False

3. The road surface will be the most slippery during the first few minutes of a rainstorm.
   _____True _____False

4. The reason a four-wheel drive vehicle has better traction in snow is because all four wheels have power.
   _____True _____False

5. Ice gets more slippery as the temperature decreases.
   _____True _____False

6. A fogged-up windshield is caused by
   _____A. fog on the outside of the windshield.
   _____B. a heater malfunction.
   _____C. vapor from your breath.
   _____D. improper cleaning solutions.

7. In a strong wind, which vehicle is more inclined to tip over?
   _____A. Automobile
   _____B. Motorcycle
   _____C. Pick-up camper
   _____D. Van

8. Hydroplaning is
   _____A. a condition involving water on the road surface.
   _____B. a condition involving ice on the road surface.
   _____C. a condition involving fog.

9. At what speed would hydroplaning likely occur?
   _____A. 25 mph
   _____B. 35 mph
   _____C. 45 mph
   _____D. 55 mph

10. The place on the roadway where ice would most likely be found is
    _____A. on overpasses and bridges.
    _____B. on curves.
    _____C. near intersections.
    _____D. near the edge of towns.

11. Rocking the vehicle means
    _____A. to make it sway back and forth as you drive.
    _____B. quick starts and stops.
    _____C. testing your shocks.
    _____D. going back and forth to get unstuck.

Pre/Post Assessment Answers

Adverse Weather Driving

1. False
2. False
3. True
4. True
5. False
6. C
7. C
8. A
9. D
10. A
11. D

Appropriate Instructional Materials

Adverse Weather Driving

Films:

"Tire Hydroplaning" (6590), "Facts About Tires" (6821), Montana State Film Library, Office of Public Instruction, State Capitol, Helena, MT 59620.

"Safe Winter Driving Guides," Montana Automobile Association, 607 N. Lamborn, Helena, MT 59601.

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pp. 219-229, 305 (1977)
pp. 72, 74, 200, 208-213, 323 (1982)

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pp. 85, 131-135

Driving: A Task Analysis Approach.
pp. 175-176

Driving With Car Control.
pp. 163-164

In the Driver's Seat.
pp. 241-242, 243-246, 250

Learning to Drive: Skills, Concepts, and Strategies.
pp. 209-218

Safe Performance Driving.
pp. 90, 146-158, 163-167, 169-170, 173, 194-195, 198-201, 248-249, 308-310, 378, 381

Sportsmanlike Driving.
pp. 154-155, 160-161, 227, 322

Tomorrow's Drivers.
pp. 139-141

Unit D:

Accident Prevention

Unit D:
Accident Prevention

Concepts:

1.0	Highway Accidents
2.0	Minimizing Impact Forces
3.0	Vulnerability of Small Cars
4.0	Occupant Restraint
5.0	Collision Scene
6.0	Financial Responsibility

Content

Learning Guides

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit D: Accident Prevention

1.0 Highway Accidents

Principle: The highway transportation system has been a major factor in this country's progress. However, as with fire, nuclear energy, and other useful instruments, the characteristics which make the automobile useful also make it potentially dangerous. Our inability to adequately control the dangers associated with the use of the vehicle has produced a major problem in the United States. The content emphasizes that most accidents are due to inefficiencies and, therefore, can be controlled. Traffic accidents are due to multiple causes and, therefore, need multiple solutions.

1.1 Traffic Accident Facts

Objectives/ Student Behavior: Classify traffic accident data, and suggest implications of this data for system improvement.

Learning Activities: Teacher-led presentation of national, state and local traffic accident data (visual aids). Analysis of charts and graphs of traffic accident data looking for underlying reasons to explain the surface facts.

1.2 Accident Records

Objectives/ Student Behavior: Summarize the purposes served by a good accident-reporting system.

Learning Activities: Teacher-led presentation emphasizing the characteristics and values of a good accident reporting system (use tables, charts and spot maps).

1.3 Accident (Definition)

Objectives/ Student Behavior:	Students will test the appropriateness of the dictionary definition of "accident" by applying it to an accident with which they are familiar. Students will ask a number of other people of various ages to define "accident," and a committee will summarize the results. Each student will formulate a definition of "accident" based on ideas that evolved out of the previous activities. Student will analyze the value of having a Uniform Vehicle Code for minimizing collisions.
Learning Activities:	Define the term "accident," emphasizing preventability rather than chance. Have a discussion on safety features which help to minimize collisions. Identify the Uniform Vehicle Code with emphasis on updating traffic laws to meet conditions and allowing standardization for more adequate knowledge of traffic laws. Discuss conditions which might cause collisions in the following areas: a. Night driving: glare, overdriving headlights, poor peripheral vision; b. Pedestrians: unpredictability, carelessness; c. Weather: slick, wet roads, fog, curves, sun glare; d. Expressways: hypnosis, speed, lane changing; e. Rural driving: side roads, blind curves, animals, farm machinery; f. Two-wheeled vehicles: difficult to see, instability, quick change of position.

1.4 Multiple Causes

Objectives/ Student Behavior:	Define the multiple cause concept, and identify the implications this concept has for driver behavior and highway safety management.
Learning Activities:	Students will analyze the factors involved in a traffic accident to determine "the" cause. From this process they will discover that accidents have multiple causes involving all three components of the system. Complete Learning Guides 49 and 50.

Content

1.0 Highway accidents and congestion reflect a breakdown or malfunction in the system and, therefore, provide one measurement of the system's efficiency and effectiveness. The function of the system is to move people and goods from origin to destination; accidents represent a failure in the task.

1.1 Properly interpreted, highway accident facts reveal the magnitude and trends of the problem and serve as valuable indications or clues as to causative factors.

A. Highway accidents represent a major social and economic problem. A few examples follow to illustrate the loss in human resources.
   1. On the average, one person dies as a result of a motor vehicle accident every 10 minutes, and a personal injury occurs every 17 seconds.
   2. Accidents are the leading cause of death in the U.S. from age 1 through age 38. Motor vehicle accidents are contributing the largest single portion of these deaths.
   3. For youths age 15 to 24 years, motor vehicle accidents cause more than 40 percent of the total number of deaths.
   4. Fatal accidents amount to only a small percentage of the total number of accidents and, therefore, are not a reliable measure of overall highway accident trends.

B. An analysis of rural-urban traffic accident statistics reveals some widely different distributions of accident types.
   1. Approximately two-thirds of motor vehicle deaths occur in places classified as rural and victims are mostly occupants of motor vehicles.
   2. In urban areas, about two-fifths of the fatalities are pedestrian.
   3. Approximately one-third of rural fatalities result from one-car accidents.
   4. Injury and property damage accidents occur more frequently in urban places.

C. Most *non-fatal* highway accidents appear to happen to average people under normal circumstances. The ordinary accident and the fatal accident appear to have quite different characteristics.

D. The highway accident problem is affected by various social, economic, political and medical factors which relate to the system; such as depression, riots, wars, urban planning, alcohol and drug use, medical services and other factors.

E. If highway accidents and their consequences are to be reduced, a well-planned, well-funded, aggressive attack must be continued—each year more drivers are driving more vehicles a greater number of miles.

1.2 A good accident records system and accident prevention program go hand-in-hand. The records system identifies critical problems that can be called to the attention of the appropriate agencies.

A. An accurate understanding of the magnitude of the traffic accident problem has not yet become possible, because so many vehicular accidents are not reported to traffic authorities.
   1. Accident reporting is a matter of local or state jurisdiction and not centralized for the nation as a whole.
   2. Not all persons are aware of their accident reporting responsibilities.
   3. Criteria for reporting differ from area to area.
   4. Many accidents occur in places remote from offices of central reporting authorities.
   5. Drivers fear they may be subject to penalties, such as revocation of drivers licenses and loss of automobile insurance if they report accidents which are traceable to their own negligence.

B. A systems approach to accident reporting seems to be required so that man-machine-environmental interaction can be analyzed.

C. A good accident reporting system can identify both high accident locations and unsafe drivers—important information to system improvements.

D. Because of built-in limitations, a traffic accident records system cannot furnish definitive data on underlying causes, comparisons between ages and sexes (exposure is a key variable), and other factors, but the system can suggest hypotheses (hunches) to researchers which can be tested by sophisticated research studies.

E. For optimum efficiency and effectiveness, accident reports should be:
   1. uniform, complete and accurate, and
   2. stored in one center in every state subject to rapid retrieval and analysis compatible with a national records system at the federal level.

1.3 A highway accident is an unplanned event which frequently leads to personal injury or property damage and is invariably preceded by an unsafe act or an unsafe condition.

A. The common definition and fatalistic connotation of the word "accident" appears to be an obstacle to accident prevention efforts. To many, the word implies that something unexpected and unpleasant occurred, but it:
   1. couldn't be helped; it was an accident;
   2. was inevitable and it could have happened to anyone;
   3. was unforeseen and uncontrollable; and
   4. is not our responsibility; we are not to be blamed.

B. A realistic appraisal of accident data clearly shows that *few* events currently labeled as accidents are really accidents in the sense of being purely chance events.
   1. Accidents, like other events, are caused. Therefore, they can be controlled when their causes are identified and understood.
   2. Frequently, events labeled as accidents are unforeseen, but they were not unforeseeable.
   3. Most accidents are not accidental, but rather reflect inefficiencies in the system. Accidents happen because people make mistakes.

C. Resulting injury or property damage is a consequence of an unplanned event and it does not in itself constitute the accident—it results from it.
   1. The injury or property damage is merely a "last happening" in a series of events, each of which to some degree contributed to the accident.
   2. When a driver falls asleep, but awakes in time to avoid a collision, the event is not recorded as an accident. A study of these near accidents would furnish clues to accident causation.
   3. The events recorded as accidents—those involving injury or property damage—represent only a very small percentage of the total number of unplanned happenings.

D. In addition to driving errors, human error also frequently underlies unsafe conditions (poor design, construction or maintenance). Therefore, most accidents can be prevented by improving the competency of both drivers and the officials responsible for designing and managing the system.

1.4 Highway accidents, as well as other accidents, generally result from a combination of man-machine-environmental factors acting in a closely interwoven fashion (multiple cause concept).

A. Each of the circumstances which contributes to an accident is *a* cause, while *the* cause is the combination of these factors, each of which is necessary but none of which is by itself sufficient.
   1. A *circumstance* is any condition or action accompanying an accident whether it contributes to the accident or not.
   2. A contributing *cause* is a circumstance without which the accident would not have happened. A cause is always a circumstance, but a circumstance is not always a cause.
   3. Each cause, if it is truly contributing to an accident, is of equal importance in that accident.

B. Of the three components in the system (people-machine-roadway), operators who almost always contribute one or more causes to the accident chain, are dominant in the sense that they possess the ability to compensate for deficiencies in the other two components.

C. Operators may "get away with" violations for years because all the other essential ingredients for the accident are not present. On the other hand, an accident could occur the first time the violation is committed.

D. The accident chain may already have some links in it before the trip begins (fatigue, emotional upset, vehicle malfunctions, etc.).

E. Highway accident investigation, research, driver education and other efforts to improve the system should focus on the *interaction* of man-machine-roadway factors.

F. If the highway system can be designed so that motor vehicles, environment, and human tasks are compatible and man is adequately prepared to perform the tasks, the probability of successfully reducing accidents and increasing system effectiveness will be greatly enhanced.

Learning Guide 49

Accident Reduction

How can each of the following contribute to or help prevent an accident?

1. Headlights:

2. Night driving:

3. Signal and warning lights:

4. Disc brakes:

5. Size of vehicle:

6. Large windows:

7. Glare:

8. Wide mirrors:

9. Color of car:

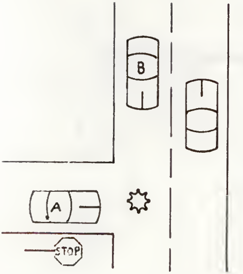
10. Sun visors:

11. Horn:

12. Windshield wipers:

Learning Guide 50

Collision Analysis

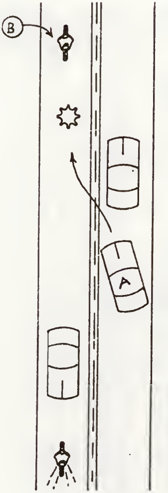


Collision resulted as Driver A, coming from side road, did not make a complete stop and hit Driver B.

What factors contributed to the collision?

Who was probably at fault?

How could collision have been avoided?

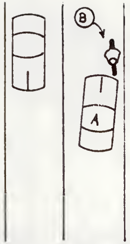


Collision resulted as passing Driver A struck mc cycle Driver B.

What factors contributed to the collision?

Who was probably at fault?

How could collision have been avoided?

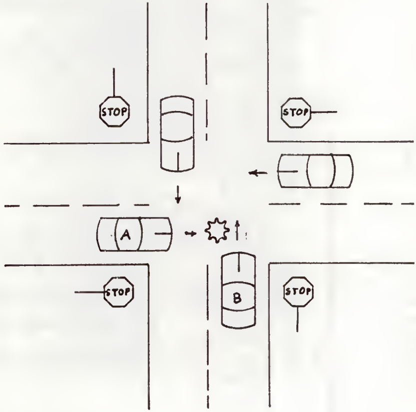


Driver A is moving at 25 mph in a residential area and hits child B on bicycle.

What factors contributed to the collision?

Who was probably at fault?

How could collision have been avoided?

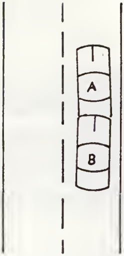


Driver A hits Driver B.

What factors contributed to the collision?

Who was probably at fault?

How could collision have been avoided?

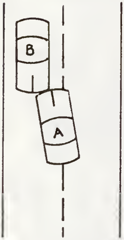


Night driving: Driver A has no taillights and Driver B hits him from the rear.

What factors contributed to the collision?

Who was probably at fault?

How could collision have been avoided?



Night driving: Driver A is drowsy and crosses the center line. Result is a head-on collision.

How could this accident have been avoided by Drivers A and B?

What defensive action could Driver B have used?

Expressway (divided): The engine of car A stops. Drivers B, C, D and E are involved in a series of rear-end collisions.

What factors contributed to the collision?

Who was probably at fault?

How could collision have been avoided?

Pre/Post Assessment

Highway Accidents

1. Accident statistics may be helpful in cutting down on the number of accidents.
   _____True _____False

2. An accident is usually an isolated event.
   _____True _____False

3. A contributing cause is a circumstance without which the accident would not have happened.
   _____True _____False

4. Accidents are uncontrollable events.
   _____True _____False

5. Almost two-thirds of motor vehicle deaths occur in places classified as rural.
   _____True _____False

6. The highway death problem is one of society's greatest problems.
   _____True _____False

7. A fatal automobile accident happens every 10-12 minutes.
   _____True _____False

8. Most accidents involve
   _____A. the element of surprise.
   _____B. a lack of concentration.
   _____C. a lack of visual search.
   _____D. All of the above.

9. The most important element in the entire traffic environment is
   _____A. the driver.
   _____B. the automobile.
   _____C. the road surface.
   _____D. traffic controls.

10. What is the principal contributing factor of vehicle accidents?
    _____A. Mechanical failure.
    _____B. Driving too fast for conditions.
    _____C. Poor hand-eye coordination.
    _____D. Hours of darkness.

11. Accidents are the leading cause of death between what ages?
    _____A. 15-24
    _____B. 1-99
    _____C. 1-38
    _____D. 16-20

12. The age where most fatal automobile accidents occur is
    _____A. 15-24
    _____B. 65-85
    _____C. 3-10
    _____D. 16-20

Pre/Post Assessment Answers

Highway Accidents

1. True
2. False
3. True
4. False
5. True
6. True
7. True
8. D
9. A
10. B
11. C
12. A

Appropriate Instructional Materials

Highway Accidents

"Accident Facts," National Safety Council, 444 N. Michigan Ave., Chicago, IL 60611.

"The Traveler's Book of Street, Highway, and Interstate Accident Facts," Personnel-Administration Dept., Travelers Insurance Co., P.O. Box 2649, Great Falls, MT 59403 (free).

Montana Highway Patrol Bureau's Annual Report.

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pp. 104, 114, 151, 156, 211, 226, 234-235, 289-290 (1982)

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pp. 195, 231-232

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pp. 93-110, 116, 211, 221, 228

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pp. 3, 71, 225, 236, 294

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pp. 10-14, 81-82, 178-179, 188-189

Safe Performance Driving.
pp. 68-69, 243-251, 274-275, 330, 338, 343, 346-347

Sportsmanlike Driving.
pp. 52, 101-104, 123, 134-140, 220-221, 235-236, 274-275, 317

Tomorrow's Drivers.
pp. 6, 71

Unit D: Accident Prevention

2.0 Minimizing Impact Forces

Principle: Safety countermeasures contribute substantially to reducing the overall end results of human and property losses. The number of collisions, injuries and fatalities can be reduced by better packaging of vehicle occupants, and improving vehicle and highway design.

2.1 Impact Forces

Objectives/ Student Behavior: Predict the effect that different speeds and impact distances have on collision consequences. In addition, when given a series of emergency situations (via film, slides or diagrams) where a quick response is needed to avoid or reduce the impact of a collision, select the better course of action from the alternatives given for each situation. Students will identify the purpose of specific safety features of vehicles and will define how use of vehicle safety equipment can minimize impact forces. Students will write a description of safety features needed or to be improved in vehicles.

Learning Activities: Discuss how the following safety features can help to lessen impact: impact absorbing bumpers, collapsible steering wheels, door locks, recessed handles and knobs, padded dashboards and sunvisors, shatterproof windshields, inflatable impact bags, seatbelts and shoulder restraints, and head restraints.

2.2 Packaging

Objectives/ Student Behavior: Students will be able to describe the similarities between packaging a fragile object for shipping and packaging the occupants of an automobile for driving.

Learning Activities: Have the students package a raw egg in some type of protective material; then drop from a given distance. Relate this to packaging of humans in automobiles.

2.3 Motorbike Operator Vulnerability

Objectives/ Student Behavior:	Students will be able to identify the measures available to a motorbike operator that will reduce the personal injury consequences of a collision.
Learning Activities:	Discuss why motorcycle riders should always wear a helmet.

2.4 Highway Design

Objectives/ Student Behavior:	Given a series of pictures, the students will identify good and bad features of highway and near-highway design with respect to collision avoidance and impact consequences.

2.5 Vehicle Design

Objectives/ Student Behavior:	Students will be able to identify and appraise vehicle features closely associated with operator efforts to avoid collisions.
Learning Activities:	Discuss defensive driving.

Content

2.0 As a vehicle goes into motion, physical laws cause both the vehicle and the occupants to undergo changes that would affect the consequences should a collision occur.

2.1 The severity of injuries resulting from impact depends upon the peak load of the force, the distance in which the force is dissipated, and the distribution of the force.

A. Kinetic energy and angle of impact are major factors determining the force of impact in a motor vehicle collision.
   1. Doubling the weight of a moving body doubles the kinetic energy, but doubling the velocity increases the kinetic energy four times.
   2. In a collision, kinetic energy is dissipated by crushing and bending the metal of the vehicle and the object with which it collides.
   3. Low speed collisions can generate forces powerful enough to cause fatalities.
   4. Angle of impact relates to severity; so if you must hit something, hit it at an angle in order to reduce the kinetic energy dissipated by impact.

B. In an automobile collision, the momentum of the car and the occupants (or cargo) is dissipated in two separate but related collisions.
   1. The *first* collision occurs between the car and a tree, another vehicle, or some other part of the environment.
   2. When the vehicle decelerates rapidly from the collision, the occupants or cargo, if not secured, continue to move forward at the speed of the vehicle prior to impact. Cargo can become a lethal weapon in the process of dissipating its momentum.
   3. The *second* collision, a fraction of a second later, occurs between occupants and some part of the car's interior or the environment outside of the car if the occupants are ejected.
   4. The first collision produces vehicle and possibly property damage, while the second collision may result in bodily injury or death.
   5. Human and vehicle are decelerated at different rates as they contact different obstacles offering different resistances. The car may strike a dirt bank, while the occupants strike the windshield with their heads.
   6. If the secondary impact can be prevented by a restraint system and other means, the only force that might cause injury is the rapid deceleration of the body.

C. Other factors equal, the force of impact varies *inversely* with the distance required to dissipate the force.
   1. If you strike a non-moving object (tree), the resultant force is greater than if you strike an object (vehicle) which is moving, or can be moved easily in the direction of your path.
   2. A rating of collisions from worst to least finds this order: head on; hitting a fixed object; rear end collision; and sideswiping.
   3. It is better to steer off the highway (usually to the right) and impact bushes or a snowbank, which are capable of some energy absorption, than to hit another vehicle or an immovable object.
   4. When a vehicle strikes an unyielding object such as a bridge abutment, the car itself does some collapsing (bumpers, fenders and hood), which lessens the force on the vehicle occupants.
   5. The probable impact surfaces of the vehicle should be deformable to increase impact distance and time (1/10 second compared to 1/50).
   6. Collapsible steering wheels and padded instrument panels are vehicle design features which increase the time required to dissipate the momentum of the vehicle occupant when they impact the car interior.

D. If impact force is distributed over a wider area, the chances of injury are reduced.
   1. Five pounds of force with an ice pick is too much.
   2. Some persons have survived unbelievably high falls because the impact was distributed over a large section of the body.
   3. Projections and edges, both inside and outside the vehicle, should be eliminated as much as possible.

2.2 Most motor vehicle crashes involve forces which would be survivable if the occupants were adequately "packaged" within their vehicles.

A. Packaging vehicle occupants should follow principles similar to those used in shipping a fragile object.
   1. Just as a well-designed container used to ship fragile items should not open and spill its contents, so should the doors of an automobile stay closed during an accident, keeping the passengers inside the car. Safety latches reduce the risk of occupant ejection, and locking the door reduces the chances of a door opening in a roll-over or side collision.
   2. A container designed for safety of contents is yielding, so that it will cushion and distribute impact, but at the same time will resist crushing.
   3. Fragile objects shipped inside containers are normally protected by energy-absorbing materials. Padded sun shades, instrument panels and collapsible steering wheels illustrate this principle in automobiles.
   4. Articles inside the package should be anchored to the container at its strongest points to keep them from moving inside the package. Seat belts must be anchored securely to the vehicle and worn snugly across the strongest part of the body for offering resistance to collision forces.

B. Focal points of the packaging effort identified by automotive crash injury research are:
   1. *windshield*—leading cause of head injuries;
   2. *steering assembly*—produces the maximum number of injuries because the exposure is greater (a safety device in a sense—restrains the driver from moving forward upon impact);
   3. *instrument panel*—design of the instrument panel is critical when only a lap belt is used;
   4. *side door panels*—vehicle occupants are particularly vulnerable during side impact collisions;
   5. head support—to reduce neck injuries sustained from rear end collisions (should be adjusted low enough so the driver can glance over it during lane changes); and
   6. *rear view mirrors, sun shades, knobs, handles*—can produce injury.

2.3 The operator of a motorbike has some special problems and protective measures to consider.

A. Two-wheeled vehicles violate the "packaging" principle, since there is no enclosing structure to cushion and distribute the forces of impact, or to prevent the vehicle from spilling its contents.

B. In some instances (when a crash is inevitable) jumping is less dangerous than being thrown, because if you lose control of a motorbike you stand the chance of being trapped between the vehicle and the roadway surface.

C. Motorbike operators have means of limiting the extent of their injuries should a crash occur, namely:
   1. approved helmet, meeting federal standards, for rider and passengers;
   2. approved face or eye protection;
   3. gloves; and
   4. sturdy outer garments—jacket, pants and shoes.

D. In equipping a motorbike the operator should consider that:
1. protrusions such as mirrors, extra lighting, roll bars and luggage racks may become instruments that can penetrate the body in a collision;
2. control levers should have "ball-ends" to prevent stabbing;
3. seat back rests may be lethal in a spill in which the bike spins;
4. exhaust pipes should be tucked away and shielded to prevent burns; and
5. high handlebars not only provide poor control, but may increase the severity of a collision.

2.4 Well-conceived highway design can markedly reduce vehicle-vehicle and vehicle-object collisions, and in addition can minimize the severity of vehicle-object collisions.

A. That highway conditions do lead to accidents can be easily demonstrated by a "spot map" of traffic accidents.

B. Through the control of vehicle paths, highway design can separate vehicles and keep them from head-on and crossing conflicts.
1. When opposing lanes of traffic are separated sufficiently, head-on collisions are practically eliminated. (Appropriate guard rail placement and design help when the median strip is too narrow.)
2. When intersections are eliminated, intersection accidents are eliminated.
3. Controlled access highways have a much lower mileage fatality rate than all the nation's rural roads.

C. Near-path structures contribute to an increase in damages, injuries and deaths from automobile accidents.
1. Drainage ditches, guard rails (some with spearlike ends), abutments, poles, signposts, hazard warning devices, temporary barricades, trees, shrubs and parked vehicles are commonly impacted by vehicles in run-off-roadway type accidents.
2. Many of the near-path structures should and could be removed through the efforts of public officials supported by the public.
3. Highway engineers are now excluding many roadside features in the design of new highways.
4. Necessary roadside hardware such as sign supports, lighting standards and guard rails are being designed to minimize the consequences should impact occur.

D. Highway design features that protect "passively," that is, without "active" participation on the part of the driver or pedestrian (breakaway signs, lights, etc.) are usually preferable to those requiring active cooperation.

2.5 Vehicle design plays an important part in the operator's efforts to avoid the first collision, without which the second collision cannot occur.

A. A vehicle must have handling qualities so that it can be maneuvered quickly and accurately, and a high degree of stability so that it will hold the road when steered hard on unfavorable surfaces. Operators need a predictable steering system that gives them a "feel" of the road.

B. Collision avoidance depends in large measure on driver visibility, which is influenced by body design (windshield and windows, corner pillars, hood and fenders, headlights, turn signals, taillights and stop lights, windshield wipers and rear view mirrors).

C. Accident avoidance also depends upon the mechanical durability and reliability of the vehicle, particularly with respect to power steering and braking.
   1. Improvements are being made in brakes and tires to aid braking performance, particularly in emergency stops (anti-skid device).
   2. Power steering helps to retain effective control when certain forces on the front wheels are increased (blow-out, wheels drop off the pavement edge, etc.).

D. Even when a collision appears inevitable, drivers should use the maneuvering and other capabilities of the vehicle to maintain control and try to avoid a crash up to the last second.

E. Many improvements have been made in vehicle characteristics, and many others will be forthcoming as a result of research, along with consumer awareness and demand for safe vehicles.

Pre/Post Assessment

Minimizing Impact Forces

1. The most important piece of safety equipment for the motorcycle rider is the helmet.
   _____True   _____False

2. A collapsible steering wheel is designed to help absorb impact should the driver be thrown against it.
   _____True   _____False

3. If you double the speed and hit a stationary object, you increase the kinetic energy by four times.
   _____True   _____False

4. If impact force is distributed over a wider area, the chances of injury are reduced.
   _____True   _____False

5. Most vehicle crashes are survivable if people are adequately packaged.
   _____True   _____False

6. When opposing lanes of traffic are separated sufficiently,
   _____A. head-on collisions are practically eliminated.
   _____B. there is an increased tendency to drive in the wrong lane.
   _____C. driving becomes poorer because drivers pay less attention.

7. Which of the following would help most to "package" people safely in automobiles?
   _____A. A law requiring use of seat belts.
   _____B. Stronger materials for automobile construction.
   _____C. Voluntary use of available safety systems.
   _____D. Development of new safety systems.

8. Which of the following would be included in highway design for safety?
   _____A. Hazard warning devices.
   _____B. Break-away signs.
   _____C. Ends of guard rails buried in the ground.
   _____D. All of the above.

9. The second collision has reference to
   _____A. your second accident.
   _____B. the recoil effect after a car strikes an object.
   _____C. the collision between occupants and some part of the car.
   _____D. the passenger being restrained by a seat belt.

10. Most collisions involve faulty
   _____A. drivers.
   _____B. brakes.
   _____C. steering control.
   _____D. roadways.

Pre/Post Assessment Answers

Minimizing Impact Forces

1. True
2. True
3. True
4. True
5. True
6. A
7. C
8. D
9. C
10. A

Appropriate Instructional Materials

"Injury Control" Pamphlet, Insurance Institute for Highway Safety, Watergate 600, Washington, D.C. 20037.

"Perception of Driving Hazards," Shell Oil Company, Public Relations Manager, P.O. Box 2463, Houston, TX 77001 (free).

Films:

"Whiplash," Aims Instructional Media Services, Inc., P.O. Box 1010, Hollywood, CA 90028.

"UFO-Unrestrained Flying Object," Montana State Film Library (no. 8797).

Textbook References

Drive Right.
pp. 64-65, 142-144, 350 (1977)
pp. 79-80, 196, 233-234 (1982)

Driving and Traffic Safety.
pp. 18-26

Driving: A Task Analysis Approach.
pp. 7, 9, 14, 65-66, 159, 233-235, 247-249, 259-271

Driving With Car Control.
pp. 21, 28

In the Driver's Seat.
pp. 5, 90, 92, 94, 201, 270, 273-274

Safe Performance Driving.
pp. 116, 247-248, 385-402, 435

Sportsmanlike Driving.
pp. 220-221, 298-299

Tomorrow's Drivers.
pp. 19, 102-104, 136, 148, 220

Unit D: Accident Prevention

3.0 Vulnerability of Small Cars

Principie: This concept serves to introduce students to the vulnerability of the small vehicle and its implications for safety. Major emphasis is placed on large and small car crash comparisons and small car safety handicaps. The accidental death rate for sub-compact cars is greater than for either the compact or full-size cars. It can generally be stated that the occupants of smaller, lighter vehicles fare worse than their counterparts in larger, heavier vehicles when involved in a crash.

3.1 Small vs. Large Vehicles

Objectives/ Student Behavior: The students will be able to summarize the major points related to the statement, "In general, the smaller the vehicle the less crash protection is provided."

Learning Activities: Discuss how the search for economy has compromised our safety.

3.2 Small Car Occupancy

Objectives/ Student Behavior: The students will be able to explain why small car occupants fare so poorly in a crash.

Learning Activities: Compare impact-absorbing materials of small and full-size cars.

3.3 Survival Space

Objectives/ Student Behavior: The students will be able to define "survival space" as it relates to smaller and lighter vehicles.

3.4 Ground Clearance

Objectives/ Student Behavior:	The students will explain the implications of lowered ground clearance on small car driving.
Learning Activities:	Discuss the problems with the increased ground clearance of some pick-ups and trucks.

3.5 Visibility

Objectives/ Student Behavior:	Students will summarize the visual problems associated with driving a smaller, lower automobile in traffic.
Learning Activities:	Discuss how major problem in seeing small cars is that we do not "psychologically" see them.

3.6 Highway Hazards

Objectives/ Student Behavior:	Students will explain why the highway environment may be less forgiving of errors made with smaller, lighter vehicles than those made with large, more crashworthy vehicles.
Learning Activities:	See concept 2.0, Unit C of Section II.

3.7 Small Cars and Large Trucks

Objectives/ Student Behavior:	Students will explain why the problem of the small car versus the increasingly large truck is one which will grow.

Content

3.0 A principal concern associated with the changing vehicle mix is the increasing vulnerability of the occupants of smaller vehicles.

3.1 Even when small vehicles (cars and pick-ups) virtually replace larger cars and pick-ups on the road, with all other factors being equal, driving a small vehicle will still mean a higher risk of injury in a crash.

A. In general, the smaller vehicles become, the less protection they provide in a crash.
   1. In recent years, small cars made up 38 percent of the cars on the road, yet small car occupants accounted for 55 percent of the deaths in two-vehicle crashes.
   2. In the same year, large cars made up 62 percent of the fleet but accounted for only 45 percent of the occupants killed in two-vehicle crashes.
   3. In fatal crashes between sub-compact and full-size cars, occupants of sub-compact cars are eight times more likely to be fatally injured than the occupants of full-size vehicles.
   4. In collisions between compacts and sub-compacts, the chances of being killed in the smaller car are three times as great.
   5. In single vehicle crashes, persons riding in small cars are still at greater risk.
   6. Regardless of age, sex, race, prior violation record, urban-rural sites, or night-day, smaller vehicles in single as well as multiple vehicle crashes are more frequently involved in occupant deaths.

3.2 The reasons small vehicle occupants fare so poorly in crashes lie in the physical laws of mass, motion, and acceleration.

A. When a heavy vehicle hits a light one, the light vehicle is at a physical disadvantage.
   1. The greater the size, the greater the area over which the forces of impact can be displaced or absorbed.
   2. In a crash with a larger, heavier vehicle the smaller, lighter vehicle and its occupants will be subjected to greater crash forces.
   3. It is estimated that once vehicles are downsized to 3,000 pounds, every additional 100 pound decrease in weight diminishes the crashworthiness of the vehicle by at least 5 percent.

3.3 There is generally less "survival" space in smaller vehicles.

A. Survival space means room for the occupant to be held by occupant restraints without being smashed into injurious surfaces, and enough room to prevent being crushed or hit by a collapsing surface.

B. In crashes where people suffered fatal and life threatening injuries, the regions of the body most commonly hurt are the head, neck, chest, and abdomen.

C. Smaller and lighter vehicles generally have less physical structure available to absorb and manage crash energy and forces.

3.4 Smaller vehicles have less clearance off the ground and thus are more likely to strike objects in the roadway.

A. The driver's line of sight is lowered, making it more difficult to see an object within safe stopping distance. The distance the driver can see over the top of a rise (assured clear distance) is reduced.

B. Lower vehicles can snag on obstacles, potholes, curbings and structures such as breakaway sign supports.

C. Doors may not clear the curb, causing occupants to exit by the streetside door into traffic.

3.5 It is both more difficult to see a smaller, lower car and more difficult for small car drivers to see.

A. Highway design standards for safe stopping or passing sight distances are based on an average driver's eye height of 45 inches.
   1. Typical driver eye height in a small vehicle varies from 36 to 41 inches.
   2. The average driver eye height since the advent of the small car era is about six inches lower than the previous average.

B. Because drivers sit lower to the ground, driver eye height is lowered, and
   1. vision of the driver over and around other vehicles is affected;
   2. visibility of overhead traffic signals may be reduced;
   3. vision beyond highway objects, such as guard rails and hedges, is reduced.

C. Visibility of smaller, lower vehicles in the rear vision mirrors of other, higher vehicles is reduced.

D. With a lowered line of sight, drivers of smaller vehicles generally cannot see as well over the top of a hill or around a curve.
   1. Seeing over the crest of a hill is critical to safety.
   2. Highway fatalities occur twice as often on the crest of uphill curves as they do on the bottom of them.
   3. Small car drivers need to be extra cautious on curves and hills to compensate.

E. The problems of the full-size automobile following a truck or bus are not greatly different from a sub-compact following a regular passenger van or pick-up truck with a camper. In each case, visibility is substantially restricted, particularly during heavy traffic conditions.

3.6 In the past, changes in the highway itself were made to compensate for human mistakes without substantial penalties to the users.

A. With the changing vehicle mix, the system will be less forgiving of errors made with smaller vehicles than those made with larger, more crashworthy vehicles.
   1. The breakaway sign poles and light poles designed for heavier cars can kill the occupants of lighter cars without breaking away.
   2. The present concrete median barriers cannot contain some of the largest, heaviest trucks, and a number of the smaller cars tend to climb up onto the barrier and flip over.
   3. The rigidity of most bridge rails now in use is a problem to smaller vehicles.

B. As automobile size decreases, there is concern about safety structures like bridge rails, breakaway signs, and crash cushion protection for occupants of smaller vehicles and heavier trucks.
   1. Transportation and design engineers must be encouraged to plan ahead to prevent the environment from further increasing the crash and injury severity rate.
   2. Recognition that reduced eye height and its effect on the design of both hills and curves and the marking of no passing zones is an increasingly critical problem.
   3. Reevaluation of crash barriers so that they are designed to be effective for smaller, lighter vehicles is essential.
   4. Breakdown units designed for the impact resulting from larger vehicles must be downgraded and new, lighter materials must be used for small signs so that smaller vehicles can ride over them as do larger ones.
   5. With changing eye level, the angle of sight changes and standards for sign heights and locations should be reassessed to be sure they are adequate for the driver of a small car.
   6. Drivers of downsized vehicles must become aware of the possible problems and potential hazards of driving on highways designed for larger vehicles.

3.7 The problem of the smaller vehicle versus the increasingly larger truck can only worsen.

A. The projected increase in truck vehicle mileage traveled (VMT), increased truck size, and automobile downsizing emphasizes the need for countermeasures that will decrease the likelihood of car-truck crashes and reduce their severity when they do occur.

B. New hazards are appearing—the increased under-riding of large trucks, and the inability of small vehicle drivers to see enough of the road ahead around the bulk of large (even dualized) trucks.

C. Traditional problems, such as truck splash and spray, are compounded when small vehicles are involved.

D. In traffic situations involving longer, heavier trucks, small vehicle drivers must be aware that:
   1. longer trucks will require greater distance to pass;
   2. heavier trucks may have reduced acceleration and stopping capabilities;
   3. crashes in which a passenger car hits the side or the rear of a tractor-trailer truck occur mostly at night, suggesting that the car driver did not see the truck in time (if at all).

Pre/Post Assessment

Vulnerability of Small Cars

1. Occupants of smaller cars are subject to greater crash forces.
_____True _____False

2. The difficulty in seeing small cars and motorcycles on the roadway is partly psychological.
_____True _____False

3. Some highway safety aspects built many years ago are actually dangerous for small cars today.
_____True _____False

4. A small car actually has more "survival" space.
_____True _____False

5. Problems of vehicle mix (small car-large truck) can only worsen.
_____True _____False

6. Most of today's drivers are not in the habit of looking for small cars.
_____True _____False

7. What happens when a larger vehicle and a smaller vehicle crash is
_____A. dependent on the speed of the smaller car.
_____B. the small car is at a disadvantage.
_____C. both will be damaged about the same.

8. Where would you expect most accidents to occur?
_____A. At the bottom of the hill.
_____B. At the crest of the hill.
_____C. In the middle of the hill.

9. Because drivers of small cars sit lower to the ground
_____A. vision over and around other vehicles is affected.
_____B. visibility of overhead traffic signals may be reduced.
_____C. vision is more easily blocked.
_____D. All of the above.

10. Drivers of small cars must realize that large trucks
_____A. take longer to stop.
_____B. have reduced acceleration capabilities.
_____C. may not be able to see them in their mirrors.
_____D. All of the above.

Pre/Post Assessment Answers

Vulnerability of Small Cars

1. True
2. True
3. True
4. False
5. True
6. True
7. B
8. B
9. D
10. D

Textbook References

Vulnerability of Small Cars

Drive Right.
pp. 338-339 (1977)

Driver Education and Traffic Safety.
pp. 22-26

Driving: A Task Analysis Approach.
pp. 288-292

Tomorrow's Drivers.
pp. 223-225

Unit D: Accident Prevention

4.0 Occupant Restraint

Principle: Most highway crashes involving a motor vehicle would be survivable if the occupants were adequately "packaged" within their vehicles. Occupant restraint devices are part of this packaging. Safety belts first appeared as an option in automobiles in the late 1940's. The technology to build comfortable, reliable, and crashworthy cars has developed since that time, as has the technology of occupant protection. Yet, there is limited awareness of the importance of this protection. This concept emphasizes the crashworthiness aspects of occupant restraints with the aim of increasing the awareness of occupant safety practices in motor vehicles.

4.1 Crashworthiness

Objectives/ Student Behavior: The students will define motor vehicle crashworthiness and illustrate how it has been improved through the years.

Learning Activities: List the improvements in automobile crashworthiness over the past 20 years.

4.2 Restraint Systems

Objectives/ Student Behavior: Students will be able to explain the reasons for wearing a safety belt.

4.3 Manual/Active Restraints

Objectives/ Student Behavior: Students will be able to define the types of manual/active restraints.

Learning Activities: Discuss who is responsible for keeping us safe—the government or ourselves.

4.4 Automatic/Passive Restraints

Objectives/ Student Behavior:	Students will be able to distinguish between manual and automatic restraint systems. Define types of automatic passive restraints. Describe operation and equipment of automatic safety belts. Describe air cushion/air bag operation and identify special cost consideration.
Learning *Activities:*	Complete Learning Guide 51.

4.5 Child Restraints

Objectives/ Student Behavior:	Students will be able to explain the need for special protection for children riding in motor vehicles. Students will identify scope and consequences of children riding unrestrained or incorrectly restrained in motor vehicles. Students will explain the implication of early-in-life habit formation on passenger restraint system usage.
Learning Activities:	Discuss Montana's Child Restraint Law.

4.6 The Human Collision

Objectives/ Student Behavior:	Students will be able to identify the two kinds of motor vehicle collisions and define the second or "human" collision. Students will describe the person-to-person collision and explain what happens to occupants in a crash.
Learning Activities:	Discuss why it is dangerous to have speakers in the back window of a vehicle.

Content

4.0 Crashworthiness is the science of packaging people in automobiles so that when crashes occur (millions each year), the occupants are not unduly damaged.

4.1 Although many traffic and motor vehicle safety programs are aimed at preventing accidents, it is not realistic to expect that all crashes can be prevented. Programs to improve motor vehicle crashworthiness are an effort to reduce injuries and fatalities through the design of vehicles and equipment to better protect occupants if the vehicle is involved in a crash.

A. Three areas of vehicle design directly affect the likelihood of surviving a crash without serious injury:
   1. Structural integrity—to prevent occupants from being ejected, trapped, burned, or crushed by collapse of the occupant compartment.
   2. Crash injury management—to absorb, control and reduce crash forces on the occupants.
   3. Occupant restraint—to prevent or soften the second collision with the vehicle's interior.

B. The science of crashworthiness has progressed to the point where engineers can design crashworthiness, not only into safety glass and padding, but into the car body structure as well.
   1. The passenger compartment is more resistant to collapse.
   2. Specially designed restraints—active and passive safety belts, child safety seats, and air cushions—can protect occupants from death and injury in increasingly higher speed crashes.

4.2 Restraint systems appear to offer the single best protection for the automobile occupant during an impact, because they prevent ejection—a leading cause of death.

A. The best restraint system for American cars, at present, is the 3-point type which includes both a lap belt and a shoulder strap.
   1. The lap belt, correctly mounted and worn, provides support to the body's sturdiest framework, the pelvic girdle.
   2. The lap belt alone has the disadvantage of allowing the head and thorax to swing free in a "jack-knife" motion during impact, which frequently results in the head striking the instrument panel. (Without the belt, the head would probably strike the windshield.)
   3. The diagonal shoulder belt provides restraint to the upper torso, from the hip on one side to the shoulder on the opposite side.
   4. When the diagonal belt is used alone, there is nothing to prevent the lower torso from swinging forward and rotating out of the diagonal belt. *The shoulder strap is not to be used without a lap belt.*

B. Occupant restraint has traditionally been provided by manual (or active) seat (lap) belts that have been standard equipment in new cars since 1964.
   1. Lap belts have been available for retrofit in automobiles since the late 1940's and have been standard equipment since 1964.
   2. Since 1968, lap and shoulder belts have been required in the front outboard seating positions of all cars sold in the United States.
   3. Usage rates have been so low that the safety potential has never been approached.
   4. An unused safety device is no safety device at all. Only about one out of every 10-14 motorists wear the safety belts in their cars.
   5. This has led to the development of automatic restraints (air bags and automatic safety belts).

C. When a significant number of all vehicle occupants use available manual restraints, it is estimated that an additional 9,000 lives, tens of thousands of serious injuries, and billions of dollars now lost in automobile crashes will be saved each year.
   1. Lap and shoulder belts, when worn properly, reduce a person's chance of being killed or seriously injured by at least 60 percent.
   2. For crashes above 40 miles per hour, studies of accident victims show that few occupants (about three percent) were wearing their belts when they needed them.
   3. Of every 100 occupants who suffer serious or fatal injuries, 57 could have survived or suffered less serious injury had they used restraints.

D. Cars built with air bags (cushions) and automatic safety belts have shown that they can reduce an occupant's chance of death and injury by about 50 percent.

E. The most effective means of protecting vehicle passengers in a collision is through the use of available safety belt systems. Unfortunately, few people make use of the protection afforded by safety belts.

F. The purpose of safety belts is to:
   1. maximize whatever benefits can be achieved during the first collision by "riding down." By absorbing the impact of the first collision sooner, belts give the benefit of increased stopping distance and dissipation of the forces of impact by the car itself.
   2. minimize the harm of the second collision. By taking the forces of the impact quickly, belts dissipate those forces through a relatively safe medium (the belt itself) instead of through a dangerous medium (glass or steel).
   3. Safety belts help occupants in five ways:
      (a) There is a riding down benefit, in which the belt begins to stop the wearer as the car begins to stop.
      (b) A belt helps prevent the head and face of a wearer from striking objects such as the steering wheel, windshield, interior posts or dashboard.
      (c) Belts spread the stopping force widely across the strong parts of the body.
      (d) Belts help the driver maintain vehicle control, thus decreasing the possibility of an additional collision.
      (e) Belts keep occupants in the vehicle.

G. Modern safety belts and shoulder harnesses are designed for comfort, ease of use, and effectiveness.
   1. In a crash, or during rapid deceleration, belts lock up and restrain the occupant. Inertia locking devices (retractors) make this possible.
   2. A retractor is the device which winds up the slack in a loose or unused safety belt.
      (a) Under normal driving conditions, this system allows belted occupants freedom to bend forward and sit comfortably.
      (b) A person who is wearing a belt can, for example, reach out and operate controls mounted on the dashboard.
      (c) The shoulder part of the belt will pull out as the person moves forward and will be pulled back by the retractor when the person returns to a normal seating position.
      (d) Only in an emergency, such as a panic stop or collision, will the retractor automatically lock and restrict forward movement of the person in the front seat. This is why these types of retractors are called "emergency locking."

H. There are two types of emergency locking retractors:
    1. A belt-sensitive retractor locks when it senses any quick movement of the shoulder belt.
    2. In a collision, a belted person moves forward very quickly and produces such a movement of the belt.
    3. There is a very simple test to check if the vehicle has belt-sensitive retractors. Grasp the shoulder part of the belt and give it a very sharp tug. The belt should lock before it has pulled out more than a couple of inches.
    4. If the belt does not lock in this test, your car may have vehicle-sensitive retractors.
    5. Vehicle-sensitive retractors lock only when there is a quick change in the motion of the vehicle.
    6. Most seat belts in new vehicles use these retractors.
    7. The vehicle owner's manual will usually identify which type of retractor is in the vehicle and give instructions to check its operation.

4.3 A. Manual/active restraints require some action to fasten and adjust them for maximum protection. Restraints of this type include:
    1. safety belts,
    2. child safety belts,
    3. lap belts only,
    4. lap-shoulder belts,
    5. lap-shoulder belt configurations,
    6. two-buckle lap-shoulder belts,
    7. shoulder belt connecting to lap belt,
    8. combination lap-shoulder belt.

B. In a vehicle not equipped with knee bolsters a shoulder belt should never be worn without a lap belt.

C. If the lap belt does not fit due to seat position or a person's size, an extension can be purchased from an automobile dealer.
    1. Shoulder belts are best suited for people 4'11" in height or taller.
    2. The shoulder belt is fitted properly when the webbing passes over the shoulder, across the collarbone, and diagonally across the chest toward the far hip.
    3. It should allow an inch or two of slack for comfort.
    4. The shoulder belt should never be worn under the arm.

D. People shorter than 4'11" or very tall people may find it difficult to get a proper fit with some shoulder belts. This is primarily a problem of comfort rather than one of safety.
    1. In spite of some people's fears, accident investigations have found that shoulder belts do not cause serious neck injuries.
    2. A shoulder belt may cause bruises and minor fractures, but these are far less damaging than the head and face injuries received from smashing into the dash, windshield or steering wheel.

4.4 Since about 60 pecent of all occupant fatalities occur in frontal collisions, air bags, automatic safety belts, and manual belts, when used, all reduce the likelihood of deaths and injuries in such collisions.

A. While manual/active restraints require some action to fasten them In proper wearing position, automatic/passive restraints are already in position. Automatic/passive restraint systems include:
    1. automatic safety belts,
    2. air cushions (air bags).

B. Automatic safety belts automatically move into position and fit around the driver and right front-seat passenger when the door is closed. Together with impact-softening knee bars or bolsters which are built into the dashboard, they help limit forward body movement, thereby providing protection in case of a collision. The belts automatically move out of the way when the driver and passenger open their doors.

C. Air cushions are designed to prevent the driver and front-seat passengers from striking the windshield and other harmful interior surfaces when involved in frontal collisions. They consist of inflatable bags commonly packaged in the steering wheel hub and in the right side of the dashboard. Sensors and mechanisms inflate the bags automatically in about 1/25 of a second following impact above approximately 12 mph.

D. Automatic safety belt systems are easily understood by consumers because they are similar to manual belts except that they operate automatically.
   1. In automatic safety belt systems, the belt positions itself on occupants without any action on their part once they sit on the seat and close the door.
   2. Automatic/passive belts employ webbing, retractor, and latch mechanisms similar to those used in a regular three-point active belt system.
   3. In the shoulder belt and knee bolster system, automatic safety belts are connected to the front door so that when the driver and front passenger enter, sit on the seat and close the door, the belt automatically comes across them.
   4. The knee bolster takes the place of a lap belt and prevents forward movement of the lower torso during a crash.

E. The air cushion/air bag is a second type of automatic restraint system. It automatically deploys an air-filled bag between the occupant and the front interior of the vehicle during a collision. The air bag system consists of a number of basic parts:
   1. a driver air bag and inflator packaged in the hub of the steering wheel;
   2. a passenger air bag and inflator hidden in the right side of the dashboard;
   3. a sensor in the area of the front bumper, and in some systems a second sensor on the firewall;
   4. padded or inflatable knee restraints for the driver and passenger.

F. Because air bags are built into the steering wheel and dashboard, they are hidden from view and do not present questions of comfort and convenience frequently associated with safety belt systems.

G. A lap belt is available with air bag systems and must be worn to provide occupants protection in other types of crashes, i.e., side or rollover.

H. Cost is a controversial aspect of automatic/passive restraints that affects both public attitudes and technical feasibility discussions. At least five potential cost considerations are appropriate relative to air cushions:
   1. initial cost;
   2. replacement cost following deployment in a crash;
   3. reductions in bodily injury costs expected to result from reduced injury claims;
   4. reductions in insurance costs expected to result from reduced injury claims; and
   5. maintenance costs over the life of the vehicle.

I. Since automatic restraint systems have become technologically feasible, experts have known that small children must be given special consideration.
   1. Volkswagen recommends that children not ride in the front seat of its car with automatic belts until they are at least 4'10" tall.
   2. General Motors provides a special belt for the right front seat to hold a child seat, and a special mounting point for the lap portion of the automatic belt for older children who are too small to use adult belts.

4.5 Protecting children from injury in motor vehicle crashes presents special problems because of young children's small size and general dislike of being confined.

A. Children should be given special crash protection when riding in automoibles.
   1. Infants should only be transported in an infant carrier; however, they are more typically held in an adult's arms.
   2. Beyond infancy, children typically want to ride with their heads high enough to see out of the car windows.

B. Motor vehicle crashes are no respecter of children.
   1. Each year about 850 children under age five die from motor vehicle crash injuries.
   2. More than 4,000 children under age five are seriously injured in crashes as motor vehicle occupants.
   3. Children are 40 to 50 times more likely to die as a result of motor vehicle crashes than other preventable trauma.

C. Child car occupants are subjected to tremendous forces in a crash.
   1. A 20 mph crash converts a small child into a giant force.
   2. A 30-pound child hits the dash or windshield with a force equivalent to a weight of 600 pounds in a 20 mph crash.
   3. During a 30 mph impact, the force of the child's impact is equivalent to 900 pounds.

D. It is impossible for anyone to hold a child safely in the event of a 20 mph crash.
   1. Holding an infant in one's arms multiplies the child's exposure to injury.
   2. Most injuries to children are to the head and face.
   3. Small children are top heavy. Their heads are proportionately heavier than an adult's and their muscles and bone structures are softer.
   4. In a 30 mph frontal crash, a 10-pound baby would be thrown forward with a 300-pound force.
   5. An adult holding a child would be thrown forward with a force equal to 30 times his or her weight, and the child could be crushed between the person and the dashboard.

E. At least 70 out of every 100 children who have died in automobile crashes could have *survived* if they had been secured in an approved child safety restraint.

F. An approved child restraint spreads crash forces more evenly over the child's fragile body.

G. If no child restraint is available, it is better to buckle children into regular safety belts, preferably in the middle rear seat, than to let them ride unprotected.
   1. Children weighing less than 40 pounds should always ride in a child restraint.
   2. The safest place in the car for a child is in the back seat, whether or not a child restraint is being used.

H. Most young children, like their parents, ride in cars unrestrained or incorrectly restrained. Consequently, they are not protected from the violent crash forces in automobile accidents. Fewer than one out of ten children above the age of one are restrained.

I. Surveys show that when safety seats are used in cars, 50 to 75 percent are used incorrectly, thereby seriously reducing their protective value. The most common problems are:
   1. top tether strap, where needed, is not attached to anchor point;
   2. lap belt not used to secure safety seat;
   3. internal harness not fastened to secure child in safety seat or infant car carrier.

J. Special restraint systems specifically designed to protect infants and small children are available. There are also different categories or types of child safety seats. Various educational programs may refer to them in slightly different ways.

K. *Infant car carriers* (designed for use from birth to approximately nine months of age or 20 pounds).
   1. These carriers provide maximum head protection by positioning an infant in a backward facing, semi-reclining position.
   2. To provide adequate protection the carrier must be fastened to the vehicle seat by the adult safety belt.
   3. The belts inside the infant car carrier must be at least 1 to 1½ inches wide to secure the infant.
   4. Newborn and tiny infants may need a rolled up towel or blanket placed around the head and shoulders to center their small bodies in the carrier for maximum protection and comfort.
   5. **Warning:** A household baby bed or shopping carrier is not an infant car carrier.

L. *Toddler safety seats* (from approximately nine months to four years of age and 20-40 pounds).
   1. These seats are designed to face forward for children who can sit up without support.
   2. They should be used in the center rear seat for maximum protection.
   3. Some seats have an internal strap/belt system to secure the child.
   4. The strap/belt system has two shoulder straps, a lap belt, and a crotch belt.
   5. Some models sit up high on the vehicle seat and therefore require an additional top tether anchor strap.
   6. The top tether anchor strap must be attached to the metal structure of the vehicle's window or package ledge to manufacturer's instructions.
   7. If a seat with a top tether anchor strap is used in the front seat, the strap must be hooked to a rear seat safety belt latch plate.
   8. Seats without internal/strap belt systems may have a protection shield.
   9. This type of seat fits over the front of the child and is designed to catch and cushion the child in a crash.
   10. A protective shield is fastened to the vehicle seat by the safety belt, with the belt being secured around the front of the shield.
   11. It is particularly important that protective shields be used in the center rear seat to allow for improved lateral protection.

M. *Convertible safety seats* (changes from infant mode to toddler mode):
   1. The term convertible means that this type of safety seat has one position designed to protect the child from infancy to about nine months old or 20 pounds.
   2. A second "toddler" position is used for the child between nine months (or 20 pounds) and about four years (or 40 pounds).
   3. It is essential that the manufacturer's instructions be followed precisely. This is because the convertible seat requires adjustment for changing positions.
   4. Convertible seats have extra "comfort" positions which were not designed to provide crash protection and which should not be used in a moving vehicle.

N. All of the approved restraints, if used according to manufacturer's instructions, will provide adequate protection for a child.
   1. The best restraint is one that the child for whom it is bought likes and is comfortable in, the seat fits and anchors properly in the intended vehicle(s), and is convenient for the adults who must ensure its regular and proper use.
   2. Before a new restraint is purchased, it should be tried out in the vehicle(s) in which it will be used.

O. If the restraint you prefer must be bought with an "armrest," remove it.
   1. The armrest has no safety function and gets in the way when buckling or unbuckling a child.
   2. Of grave concern is the fact that many parents fail to buckle the harness, believing that the armrest provides adequate protection.

P. Habit formation is a strong determinant of passenger restraint system usage.
   1. Habits formed early in life are related to later behavior.
   2. The way in which restraint systems are presented to children of any age is a key to the receptiveness of their use.
   3. The best time to introduce a passenger restraint is on the trip home from the hospital.

Q. A child who never travels without use of a passenger restraint will tend to accept it as a routine part of automobile travel.

R. One of the best ways to promote consistent use of passenger restraint device systems is modeling.
   1. Parents, siblings, and other passengers encourage a child's use of a restraint device by use of their own restraint devices.
   2. Children can influence the behavior of their parents, siblings, and other passengers if they have been taught the importance of passenger restraint systems.

S. A bonus to parents whose children ride in child restraints is that these children usually present fewer behavior management problems to their parents than children who ride unrestrained.

T. The motion of the child must be controlled by the restraint system so that the child does not strike the interior of the vehicle.
   1. Most child restraint systems control the motion of the child by restraining the torso, either with a five-point harness or a padded impact shield.
   2. The systems that use a harness and top tether strap in a forward facing seat provide the greatest protection to the head.
   3. The top tether strap attaches to a point farther back in the car.
   4. This strap keeps the child restraint from tipping forward in a crash.
   5. The unit must remain anchored to the vehicle seat.
   6. The restraint must not collapse during a crash.
   7. Some restraints used without the top tether collapse in a crash even though they pass all the standard tests with the tether in place.

4.6 As a result of motor vehicle crash investigations, we have a good understanding of what happens to the car and to the people inside during a collision.

A. It has become clear that there are really two collisions within a single accident.
   1. The first collision is the crash in which the car hits something, buckles and bends, and then comes to a stop.
   2. The second collision is the "human collision" which occurs when a passenger hits some part of the interior of the vehicle or is ejected. It is this collision which causes injury.

B. The collision of a person against a vehicle interior is only one kind of human collision. The others are collisions of people with other people and collisions of people with objects outside the vehicle.
   1. In a collision, passengers move toward the point of impact.
   2. Since all passengers and loose articles are moving in the same direction, they collide with each other.
   3. When a motor vehicle has a frontal collision, passengers in the back seat will be thrown forward into the people in the front seat, possibly causing serious neck and/or spinal injuries.
   4. In a side collision, one passenger can collide with another, pushing him or her out a door or window.

C. A special case of person-to-person collision is that between an adult and child(ren).
   1. Parents often ride in motor vehicles while holding children in their laps. Such behavior is unsafe, whether the parents are properly belted or not.
   2. If the parent or other adult holding a child is not wearing a safety belt, he/she can be thrown forward, crushing the child between his/her body and the dashboard.
   3. If they are wearing their belts, rarely would they be able to hold onto the child in a crash.

D. Possibility of being thrown out of the car.
   1. It is better to stay inside the car. The only way to ensure that you will stay inside is with a properly fastened safety belt.
   2. Often an unbelted occupant is ejected when a door springs open in a crash or is catapulted through a window or the windshield.
   3. In such cases the vehicle often runs over or crushes the person in a rollover.
   4. Most often following passenger ejection, impact with the ground or other obstacles near the car will cause serious Injury.
   5. Many people believe they are safer if they are "thrown clear" of the car in a crash. The fact is they are 25 times more likely to be killed.
   6. Just as the human body was not designed for high speed impact with a windshield, it was not designed for high speed impact with the ground.

Learning Guide 51

Restraint Misconceptions

Misconception	Fact
1. Belts are important at highway speeds, not on short trips.	Three out of four accidents occur within 25 miles of home. Accident rates are much higher on city streets than highways. Fatalities have occurred at parking lot speeds.
2. It is better to be thrown clear of the car.	The chances of being killed are 25 times greater if ejected. Belts stop people from going through windshields and doors, hitting objects on the road, and being crushed by the car.
3. Belts may trap people in a fire or under water.	Less than one-half of one percent of all accidents result in fire or submersion. Belts help people avoid injury and unconsciousness, thus helping them escape in most cases.
4. Safety belts themselves cause injuries.	Such injuries are very rare. They are almost always less than what a non-wearer would have experienced. They are often caused by improper wearing.
5. Some people should not wear safety belts (e.g., children or pregnant women).	"Both pregnant women and the fetus are safer, provided the lap belt is worn as low on the pelvis as possible." (American Medical Assn.) Children under the age of four or weighing less than 40 pounds should use an approved child restraint. However, even young children are more safe in a lap belt than if not restrained in the event of a crash.
6. Rear-seat passengers do not need belts.	Unbelted rear-seat passengers are more at risk than belted passengers. Unbelted rear-seat passengers increase the risk of injury to front-seat passengers.
7. There are misconceptions about child restraint use. *A child is safe if held in an adult's lap.*	The forces of impact are too great for an adult to withstand, and a crash or sudden stop occurs too quickly for an adult to react. There are many cases of a child being crushed by an adult against a dashboard, windshield, or door.

8.	Any normal baby carrier can function as a makeshift protection.	Household seats or baby carriers are not built to withstand the stresses of a crash. Such carriers are dangerous since they can be thrown around inside the car in the event of a crash.
9.	Small children are less likely to be injured because they are so light and resilient.	More than three-fourths of all injuries to children in car crashes are injuries to the head causing brain damage, permanent disfigurement, epilepsy, or death. The concept of resilience does not apply to the head, the circulatory system or organs, and the flesh. Because their heads are disproportionately heavier than those of adults, children tend to fly head-first through the windshield to impact objects outside the car.
10.	A child safety seat may simply be placed on the vehicle seat.	Restraints which hook over the seat are prohibited from sale because they are very dangerous. Child safety seats must be fastened by a lap belt, and the child must be fastened in the restraint. If a top tether strap is supplied by the manufacturer, it must be anchored according to instructions.
11.	None of the existing child safety seats are really good.	Design has improved dramatically in the last few years. Children need restraint devices as well as adults. A list of crash-tested child safety seats is available from the state or U.S. Department of Transportation, some auto clubs and other organizations.
12.	Child safety seats cost too much.	The cost of child safety seats is modest compared with the optional equipment people buy for their cars. Restraints can save a child's life; a radio cannot. In many communities, community-based programs supply child safety seats to parents at low cost or on a loan or rental basis.
13.	Air cushions can go off during routine driving.	Current information suggests that the probability of accidental deployment is extremely low.
14.	Accidental deployment could cause an accident.	Inflation takes milliseconds, deflation less than ½ second; i.e., quicker than a sneeze. Noise from inflation (150 decibels) is no problem. Deflated air cushions do not seriously interfere with driving.

Pre/Post Assessment

Occupant Restraint

1. Crashworthiness of an automobile means it is an old car with a number of dents and scrapes.
   _____True _____False

2. Seat belts are only required in American-made cars.
   _____True _____False

3. The steering assembly is the leading cause of head injuries.
   _____True _____False

4. There is no way to use a seat belt on a motorcycle rider.
   _____True _____False

5. A major problem with the shoulder strap of seat belts is they cause many neck injuries.
   _____True _____False

6. Another benefit of belts is to prevent people from colliding with each other.
   _____True _____False

7. A small child can share a belt with an adult if the child sits on the lap of the adult.
   _____True _____False

8. "Second collisions" can be greatly reduced by the use of
   _____A. head rests.
   _____B. shatterproof windshields.
   _____C. seat belts and shoulder harnesses.
   _____D. collapsible steering wheels.

9. An automatic restraint system means
   _____A. You have developed a habit of "automatically" using your belts.
   _____B. It protects you without you doing anything with it.
   _____C. It automatically works during a crash.
   _____D. None of the above describe the system.

10. Concerning children and accidents—
    _____A. Children's bodies are more pliable; therefore, injury to them is usually less than to adults.
    _____B. Children are 40 to 50 times more likely to die as a result of vehicle crashes than other accidents.
    _____C. Generally speaking, a child is safe if held on the lap of an adult.

11. The best method to influence children to use their seat belts is
_____A. to pass laws that would fine negligent parents.
_____B. to offer rewards or special privileges.
_____C. to let them see pictures of injured people.
_____D. by example—parents using their belts.

12. In an accident where the vehicle goes into water
_____A. seat belts could easily trap the individual.
_____B. you would be lucky if you were not wearing your belt.
_____C. you are still safer to be wearing your belt.
_____D. seat belts prevent quick escape.

13. The use of door locks on cars
_____A. is of little use in traffic accidents.
_____B. gives an added safety feature in case of accidents.
_____C. gives very limited protection in case the car rolls but much protection in head-on crashes.
_____D. is primarily a protection device against break-ins.

14. Bodily injury may be reduced by incorporating which of the following?
_____A. Collapsible steering wheels.
_____B. Shatterproof windshields.
_____C. Padded dashboards and sun visors.
_____D. Seat belts and shoulder harnesses.
_____E. All of the above.

15. Headrests located behind the driver's and front seat passenger's heads are designed to
_____A. Prevent whiplash in case of collision.
_____B. Rest the head while driving.
_____C. Serve as a pillow when stopped.
_____D. None of the above.

Pre/Post Assessment Answers

Occupant Restraint

1. False
2. False
3. False
4. True
5. False
6. True
7. False
8. C
9. B
10. B
11. D
12. C
13. B
14. E
15. A

Appropriate Instructional Materials
Occupant Restraint

"Instructors Guide—Seat Belts," U.S. Government Printing Office (no. 5003-0070).

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pp. 20, 80 (1982)

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pp. 21, 28, 37, 140, 166

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pp. 41, 64-65, 90, 92

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pp. 27, 30

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pp. 20-21, 25, 28-29, 218, 220, 276, 297, 390, 395-396

Sportsmanlike Driving.
pp. 13-14

Tomorrow's Drivers.
pp. 19, 141

Unit D: Accident Prevention

5.0 Collision Scene

Principle: Very few people experience a lifetime of driving without becoming involved in a highway collision, either as a witness or a principal. This concept prepares students to cope with this eventuality, so that needless human suffering, financial loss, legal complication and other undesirable consequences can be prevented.

5.1 Stopping

Objectives/ Student Behavior: Given a description of an accident scene, the students will describe when, where, and how to stop.

Learning Activities: The class will discuss accident procedures with emphasis on when, where, and how to stop.

5.2 Marking and Controlling the Scene

Objectives/ Student Behavior: The students will be able to describe how to mark and control the scene of the accident.

Learning Activities: Discuss why it is necessary to mark and control the accident scene. Complete Learning Guide 52.

5.3 Assisting the Injured

Objectives/ Student Behavior: Students will be able to describe what action to take regarding the injured.

Learning Activities: Have a qualified person demonstrate how to control bleeding and how to administer CPR. Have a group discussion placing emphasis on what procedures to take at the scene of a collision. Cover the "Good Samaritan" law.

5.4 Words and Deeds

Objectives/ Student Behavior:	The students will be able to describe the process of exchanging information, obtaining witnesses, and recording pertinent information. Students will formulate a paper listing the information that would be left at the scene of an unattended vehicle accident.
Learning Activities:	Discuss things to do and things not to do at the scene of an accident, such as: information to obtain, what not to admit. Review the Montana accident report form. Complete Learning Guide 53. Review importance of contacting your insurance company if you hit an unattended vehicle.

5.5 Accident Reporting

Objectives/ Student Behavior:	Given the details of an accident and imagining they were one of the drivers involved, students will be able to fill out an accident report form and indicate where the form(s) should be sent.
Learning Activities:	Read about an imaginary accident and have the students sketch the accident. Include names of streets and prevailing conditions. Complete Learning Guide 54.

Content

5.0 Many benefits can result from highway users being prepared to cope with post-crash situations when directly involved or when one of the first to arrive at the scene.

5.1 When the highway user has knowledge of when, where and how to stop following an accident, there is less chance of a negative legal or safety consequence.

A. State laws require that the operator of a vehicle involved in an accident shall:
   1. immediately stop the vehicle at or near the scene;
   2. make the stop without obstructing traffic more than is necessary; and
   3. immediately return to the scene of the accident.

B. No matter what the degree of responsibility is in a traffic collision, the ultimate punishment is much less for the operator who stops, assists at the scene, and reports the accident to proper authorities, than it is for the person who leaves the scene. Panic, a mental state following a traumatic experience that tends to paralyze the reasoning center of the brain, sometimes causes people to "hit and run."

C. Highway users have a moral, if not legal, responsibility to stop when they come upon an accident shortly after it happens, when it is apparent that assistance is needed.
   1. The stop should be made well off the traveled portion of the highway, so that the vehicle does not interfere with traffic or constitute a hazard. (Precise distance will vary with conditions and the state law.)
   2. At night, conditions may warrant stopping behind the wreckage to illuminate the scene with headlights.

D. Whether your vehicle is involved in the accident or not, avoid parking your vehicle on the left side of the highway, because it may confuse oncoming traffic.

E. To help prevent fire, turn off the ignition of any vehicle involved in a collision.

F. If there appears to be adequate assistance at an accident scene, continue on. Stopping may create an additional hazard.

5.2 Marking and controlling an accident scene helps to prevent a single accident from turning into a multiple accident.

A. Smoking should be prohibited at the scene of an accident because of the danger of fire or explosion caused by gasoline being ignited.

B. At night, flares, reflectors, flashlights or some other warning device should be used to control oncoming traffic from both directions. (Position at least 400 feet from the scene.)

C. In the daytime, the accident scene also needs to be protected, particularly if it occurs near a hill crest, sharp corner or bridge.

D. Deciding whether first to set out signal devices or to assist the injured will depend upon the location and the nature of the accident, severity of injuries and availability of assistance.

E. Bystanders must be kept well away from the roadway, unless they can perform some useful and necessary service.

5.3 Your first duty, after stopping your car, is to check for injured persons and summon assistance if necessary. Do whatever appears necessary under the circumstances to relieve suffering.

A. Make sure the injured person is comfortable; but do not move the injured unless you are sure of correct first aid procedures.
   1. Good intentions on your part may result in further injury to the person.
   2. There may be a case where moving the victim is the better alternative.
   3. Do not attempt to move people who are trapped by the steering wheel or some other part of the vehicle. Perhaps you can relieve the pressure somewhat by adjusting the seat to extreme rear position.

B. In assisting the injured, one must not step over the boundary of first aid and into the area of treatment.
   1. First aid is the immediate and temporary care of the victim's injury until the services of a physician can be obtained.
   2. Treatment may be performed only by a licensed physician. Applying and administering medication, using pain pills, setting broken bones are examples of treatment.

C. Proper application of pressure directly to the wound and at pressure points is almost always effective in controlling bleeding, a common occurrence in traffic accidents.

D. If sterile compresses are not available, the inside folds of a handkerchief, towel or item of clothing may have to be applied directly over the wound.

E. Shock, another frequent condition among traffic accident victims, can be alleviated by:
   1. placing the victim in a prone position with feet slightly elevated, except in the cases of internal injuries or severe head injury;
   2. restoring or maintaining body temperature by placing material under the victim as well as on top; and
   3. attempting to comfort and reassure the person that help is on the way and that everything will be taken care of (family, luggage, etc.).

F. First aid treatment for fracture should be limited to immobilizing the broken limb and treating for shock.

G. A dry pack or wrap of four or five layers of clean muslin or cloth will reduce pain in the case of severe burns, by preventing air from striking the burned area.

H. Doctors prefer that no liquids be given to injured accident victims.

I. Respect religious beliefs if a person refuses aid or orders you not to give assistance to a family member.

J. If a number of people are available, a call for assistance can be made concurrently with the steps in aiding the injured.
   1. Call should be made directly to the law enforcement agency that has jurisdiction in the area where the accident took place. They will summon other needed services, such as ambulance, doctor and wrecker.
   2. The message should include the important points relative to the nature and location of the accident. (Let them hang up first!)

5.4 If you are involved in the accident, what you say and do at the scene may be very important in the follow-up to the accident.

A. Do not argue, accuse anyone, sign any papers or admit that you were wrong. (Hasty emotional admissions can be costly.)

B. Cooperate with the police officer by giving the basic facts briefly.

C. Exchange information with the other operators regarding name, address, vehicle registration and driver's license.

D. If you strike an unattended vehicle, leave identification at the scene (name, address and telephone number), and copy the license number of the vehicle you struck so that you may trace the ownership of the vehicle if necessary. Report the accident to appropriate law enforcement authorities to protect you from a charge of "leaving the accident scene without properly identifying yourself."

E. Obtain names and addresses of witnesses and attempt to obtain from them a signed statement as to what happened. If you witness an accident or are first on the scene, leave your name and address with the drivers who may need you as a witness.

F. Make written notes at the scene in order for a complete report to be made and have the information verified by the police. Include information on:
   1. time, date, exact location, direction of vehicles prior to impact, location of vehicles after impact, length of skid marks and other relevant information;
   2. condition of road surface and weather;
   3. names and addresses of all those in the other car, noting any who may be injured, sick, intoxicated or physically impaired; and
   4. any attempts by the other driver to cover up the vehicle or personal deficiencies.

G. Unless your injuries impel you to do otherwise, do not leave the scene of the accident until you have, as previously indicated, assisted the injured, protected the scene, called and assisted an officer, identified the other driver(s) and vehicle owner, obtained the names, addresses and statements of all witnesses, and made notes and diagrams to help you fill out the accident forms.

5.5 The proper method and timely filing of a formal accident report tend to reduce the possibility of legal and financial entanglements following an accident.

A. State laws and municipal ordinances vary as to what traffic accidents should be reported and to whom, but one safe rule is *when in doubt, report the accident.*

B. After being involved in an automobile collision, promptly notify the nearest available representative of your insurance company for instructions. Failure to file a prompt report with your insurance company may void your insurance.

C. State laws require that a written report be sent to the motor vehicle department within a certain time period of all personal injury accidents and all property damage accidents above a certain amount. Some counties and municipalities also require a report.

D. Accident report forms can be obtained from motor vehicle departments, police departments, insurance companies, or from the officer investigating the accident.

E. Accident reports must be made regardless of whether the accident was investigated.

F. The accident report form should be filled out completely and accurately, in order that your interests will be protected.

G. A list of questions regarding the information needed to fill out an accident report form (or copy of the form itself) carried in the glove compartment will serve as a valuable reference at the accident scene.

H. Request a photostatic copy of the accident report prepared by the police officer who investigated the accident.

Learning Guide 52

Collision Scene Activities

What to do:

1. Stop immediately.
2. Set up area control—warn oncoming traffic.
3. Help the injured.
4. Send for doctor and ambulance if needed.
5. Notify law enforcement agency (police, highway patrol, sheriff).
6. Get names of occupants in vehicles involved.
7. Get names of witnesses.
8. Get names and addresses of drivers of vehicles involved in the accident.
9. Write complete notes about the crash. Draw a sketch of the accident (what happened). Get details: road conditions, traffic control devices, stop signs, lights, etc.
10. Notify your insurance company (fill out accident report).

Do not:

1. Argue.
2. Accuse anyone.
3. Admit anything.
4. Sign any papers.

Learning Guide 53
Striking an Unattended Vehicle

Information to Leave at the Scene:

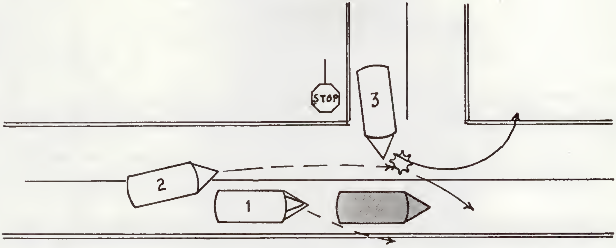
1. Leave a note with:
   a. your full name,
   b. your address, and
   c. your telephone number.

Information to Get at the Scene:

1. License number of vehicle or vehicles involved.
2. Description of car(s): year, make, model, color.
3. Note vehicle damage and area damaged.
4. Obtain the name and address of anyone who may have seen the accident (witness).
5. Report the accident to the proper authorities (police, sheriff, highway patrol).
6. Notify your insurance company.

Learning Guide 54

Drawing a Sketch of an Accident



1. Show names of highways.
2. Points of compass (N, S, E, W).
3. Show direction of vehicles involved.
4. Designate your car ☐

   Other vehicle ☐

   If more than one, number them.

Road Character
- ____Straight road
- ____Curve
- ____Level
- ____On grade
- ____Hill crest

Road Defects
- ____Defective shoulders
- ____Holes, deep ruts, bumps
- ____Loose material on surface
- ____Other (specify)____________

  ____
- ____No defects

Light
- ____Daylight
- ____Dusk
- ____Dawn
- ____Darkness—streetlights
- ____Darkness—no streetlights

Road Surface
- ____Dry
- ____Wet
- ____Muddy
- ____Snowy
- ____Ice

Traffic Control
- ____Stop sign
- ____Stop-and-go signal
- ____Other (specify)____________

  ____
- ____No traffic control

Weather
- ____Clear
- ____Raining
- ____Snowing
- ____Fog
- ____Other (specify)____________

  ____

Pre/Post Assessment

Collision Scene

1. You have a legal obligation to stop at the scene of any accident and render aid.
   _____True _____False

2. You should try to get the victim of an accident into another vehicle and transported to medical help as quickly as possible.
   _____True _____False

3. Shock will always be a factor to be dealt with at the scene of the accident.
   _____True _____False

4. Anyone who renders aid at the scene of an accident can be held negligent in the courts.
   _____True _____False

5. What you say at the scene of an accident in which you were involved could influence the disposition of the matter in the courts.
   _____True _____False

6. If involved in an accident, do not leave the scene.
   _____True _____False

7. Accident report forms need to be filled out even if the accident was not investigated.
   _____True _____False

8. Recording what happened at the scene of the accident
   _____A. is a law.
   _____B. is a good practice for later reference.

9. If you are involved in an accident, the law requires you to
   _____A. go immediately for help if none is available.
   _____B. render aid to the best of your knowledge and ability.
   _____C. obtain names of witnesses.
   _____D. record the date and time of the accident.

10. What is the first aid treatment for someone with a suspected spinal injury?
    _____A. Use a back board or scoop stretcher if you must move the victim.
    _____B. Ask the victim to move toes and fingers.
    _____C. Place the victim gently into a car and transport.
    _____D. Elevate the feet 8-10 inches.

11. Marking the scene of an accident serves what major purpose?
_____A. Identifies the spot where the accident happened.
_____B. Helps attract aid from others.
_____C. Fulfills the law requirement to do so.
_____D. Helps to prevent a single accident from turning into a multiple accident.

12. Beneficial characteristics of a good driver is/are:
_____A. experience.
_____B. good judgment.
_____C. common sense.
_____D. fast reaction time.
_____E. all of the above.

13. If you witness an accident, you should:
_____A. call the police.
_____B. continue on and don't get involved.
_____C. give your name and address as a witness.
_____D. help settle the argument.

Pre/Post Assessment Answers

Collision Scene

1. False
2. False
3. False
4. False
5. True
6. True
7. True
8. B
9. B
10. A
11. D
12. E
13. C

Appropriate Instructional Materials

Collision Scene

"In the Crash," Montana State Film Library (no. 7400).

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Driving With Car Control
pp. 95-96, 109-110, 116, 211, 221

In the Driver's Seat.
pp. 50, 292-295

Learning to Drive: Skills, Concepts, and Strategies
pp. 10-11, 32, 184

Safe Performance Driving.
pp. 338-350

Sportsmanlike Driving.
pp. 121-123

Tomorrow's Drivers.
pp. 71, 143-144

Unit D: Accident Prevention

6.0 Financial Responsibility

Principle: Insurance is a vital factor in safeguarding the future of highway users, their families and property. Regardless of an operator's own skill and ability, there is no guarantee that all collisions will be avoided. Every operator must be prepared to face the consequences of collision involvement. Legal complications, human suffering, time loss, inconvenience and expense can result from a collision, regardless of who is at fault. Type and amount of motor vehicle insurance the owner carries is an individual decision, with the exceptions of compulsory insurance and financial responsibility laws of some states. This concept will help students to acquire information needed to make intelligent decisions regarding the reduction of highway collision consequences through insurance.

6.1 Nature of Insurance

Objectives/ Student Behavior: Students will relate the basic principle of insurance to that of reducing the consequences of traffic collisions.

Learning Activities: Teacher-directed discussion of various types of insurance (life, medical, homeowner, etc.) would draw out the basic principle of insurance—spreading of risk. This could then be related to motor vehicle insurance.

6.2 Liability

Objectives/ Student Behavior: Students will define liability, negligence and judgment. In addition, they will construct a situation which would point out the values of motor vehicle insurance with respect to liability.

Learning Activities: A simple one-car accident illustrating negligence is described. From this illustration, other components could be brought in which would complicate total negligence, such as another car, yield sign or chuckholes. Students then would be asked to state why liability insurance would or would not be beneficial in each case.

6.3 Liability Insurance

Objectives/ Student Behavior: Students will determine if the amount of liability insurance is adequate when given the amount of judgment awarded to a plaintiff from civil action growing out of an automobile accident and the amount of insurance carried by the defendent.

Learning Activities: Through class discussion, distinguish each type of insurance coverage, explaining how insurance covers only a stated amount (property damage, bodily injury, collision, comprehensive, medical, uninsured motorist, no-fault insurance).

6.4 Physical Damage Insurance

Objectives/ Student Behavior: Students will identify and distinguish between damages claimable under collision insurance coverage and comprehensive auto insurance coverage.

6.5 Special Insurance Coverage

Objectives/ Student Behavior: Students will summarize the benefits of medical payment insurance, road service insurance and uninsured motorist protection. Identify the value of a financial responsibility law and explain how to satisfy the requirements of such a law when unable to obtain insurance through routine procedures.

6.6 Factors Influencing Insurance Premiums

Objectives/ Student Behavior: Students will identify the factors which influence premium rates.

Learning Activities: A couple of selected students could visit a local insurance agent and discuss the cost of a typical insurance policy. The findings could be reported back through various methods (i.e., tape recorder, one student playing role of agent and another of a beginning driver desiring insurance cost information).

6.7 Young Driver Rates

Objectives/ Student Behavior: Students will identify reasons for higher insurance rates among young drivers and the means of keeping those rates to a minimum.

Learning Activities: Emphasis should be placed on ways premiums can be lowered by the young driver.

Discussion questions:

1. Which is the most important coverage?
2. How are liability and negligence interrelated?
3. Should insurance be mandatory?
4. How would a judgment larger than the stated amount of insurance most affect the future of the insured?
5. How do insurance coverages vary among the members of the traffic education class?
6. How does no-fault insurance compare with uninsured motorist insurance?
7. What are some advantages and disadvantages of no-fault insurance?

Content

6.0 Insurance is a way for motor vehicle owners to protect themselves and others from financial losses due to negligence or other action having to do with motor vehicles.

6.1 The basic principle of insurance is spreading of risk.

A. All people who are insured are helping to pay for each other's losses.

B. Insurance is an old institution with an adventurous history. It started when owners of sea-going vessels pooled resources to protect the individual owner who lost a ship.

C. An insurance policy is really a set of policies covering liability, physical damage and special types of insurance.

6.2 People causing injury or damage to another person's self or property are liable for their actions (a legal obligation).

A. As an operator, you can be held responsible in both criminal and civil actions.
   1. Criminal responsibility is between you and the state. If you are convicted of a traffic violation, you are punished with a fine or a jail sentence.
   2. Civil responsibility is between you and the person who has been injured or whose property has been damaged. That person can sue you for damages, even if there has been no violation of criminal law.

B. Negligence is the key to whether or not a person is declared liable for damages to another individual's person or property.
   1. People are negligent when they have failed to act as reasonable and prudent persons under the circumstances (could be error of commission or omission).
   2. In other words, *negligence* is any conduct which falls below the standard established by law for the protection of others against reasonable risk of harm.
   3. Right-of-way and negligence should not be confused. You can be guilty of contributory negligence when you strike a vehicle that went through a red light. Operators have a legal and moral responsibility to avoid conflict with other highway users, despite apparent wrong actions of others.

C. If a court finds one driver *completely* to blame for an accident, it will order payment to the victim for losses (judgment).

D. Liability insurance pays for judgments against you, *within the limits of the policy.* If the judgment is more than the policy limit, you must pay the excess.

E. In most states, if the court finds that both operators contributed to the accident, no matter what the ratio of fault might be, no one collects under anyone's liability insurance coverage. (Some states have comparative negligence.)

6.3 Liability insurance furnishes protection in case you are proved liable for accident damages or sued.

A. Bodily injury liability insurance protects you for the injuries your actions cause to another highway user.
   1. A judgment for bodily injury damages could include hospital and doctor bills, loss of wages, and pain and suffering. (The last item could be the largest.)
   2. Bodily injury insurance has two limits: a limit for each *person* and a limit for each *accident*. (Usually sold in blocks of thousands like 10/20, 20/40, 50/100, etc.)
   3. Besides paying judgments for you, bodily injury liability will pay for lawyers and court costs to defend you against a suit when the accident was not your fault.

B. Property damage liability insurance (P.D.L) protects you for the damage you and your car do to the property of other persons.
   1. The property can be another car, a house, a telephone pole, a tree, a fire hydrant.
   2. P.D.L. works the same as bodily injury insurance. You must be *completely* to blame or your company doesn't pay the other person.
   3. This type of insurance is usually sold in blocks of $1,000, with $5,000 being the lowest sold in most states.

C. Liability insurance is the most important motor vehicle insurance coverage.
   1. If we hurt someone or damage property, the amount collectible could be huge.
   2. If we cannot satisfy a judgment, the court may sell our real estate and personal property or take it out of our wages until the judgment is paid (garnishment).
   3. Your operator's license will be suspended until judgment is satisfied or you are released by the other party.
   4. By protecting yourself, you protect the other person too. You've got insurance to pay for what you did.

D. Liability insurance protects the owner of the vehicle ("named insured") plus all members of the household and anyone else who has *permission* to drive the car.
   1. Also protects the "named insured" and the family while driving a car which belongs to someone else.
   2. The "named insured" is also protected if someone outside the family drives the car with permission and hurts someone or damages someone's property.
   3. A son or daughter with permission to drive the family car does *not* have authority to give others permission to drive. (Only the "named insured" can grant permission.)
   4. To be on the safe side, always get permission to drive any vehicle. Be sure that your driver's license is in order, and never use your car for racing or other illegal purposes or permit anyone else to do so.

6.4 Physical damage insurance is designed to compensate you for certain losses caused to your vehicle and/or property.

A. *Collision insurance* pays for damages to the policyholder's vehicle caused by collision or upset.

1. Protects *your* vehicle against the damage you or others might do to it while it is being operated.
2. We may be in an accident where the other operator was not all to blame.
3. We can run off the road and damage our vehicle without any other operator being involved.
4. Collision insurance is usually sold on a "deductible" plan which can be purchased in varying amounts, but the lower the deductible amount, the higher the premium. The insurance company pays for the repairs over the deductible amount.
5. Collision protection insures your vehicle for the actual cash value at the time of the loss which could be less than its replacement cost. Actual cash value is its replacement cost new less its depreciation. (Depreciation applies to partial losses as well as total losses.)
6. Your insurance agent may advise you to drop collision insurance when your vehicle reaches a certain age and has low cash value.
7. Following an accident, discuss with your agent your rights and privileges under the terms of collision insurance before you have your car repaired.

B. *Comprehensive auto insurance* pays for damage to the policyholder's vehicle caused by something other than a collision or upset.

1. Comprehensive protection covers your vehicle against direct and accidental loss or damage, regardless of what caused the damage (except for collision or upset).
2. Hazards covered include fire, missiles, falling objects, larceny, explosion, earthquake, windstorm, hail, water, flood, malicious mischief, or vandalism, riot and civil commotion and actual contact with an animal.
3. The vehicle owner can purchase just certain kinds of physical damage protection, but most people prefer the total package known as "comprehensive."

6.5 There are many additional types of insurance that fall into the special coverage category which have special value in certain situations.

A. *Medical payments* insurance covers medical and funeral expenses, up to policy limits, for the policyholder and others injured or killed while riding in the car.

1. This insurance pays regardless of who caused the accident, but will not pay if the other driver is totally liable.
2. The protection begins when you start to get in the car and is in force until you get out of the car.
3. Extended medical payments insurance, available from most companies, covers the policyholder and family when hurt in or by other vehicles when not in their own car (includes pedestrian and bicycles).
4. The smallest amount of medical payments protection is usually $500 and the largest $5,000. It costs very little more to purchase $2,000 protection as opposed to $500.
5. Medical payments insurance is really accident insurance.

B. *Road service* insurance pays towing charges if the policyholder's vehicle breaks down on the road.

1. This protection pays what it takes to help you, but usually not more than $10 to $25.
2. It does not pay for repairs to your vehicle, unless performed at the scene of disablement.

C. *Uninsured motorist protection* protects the policyholder, family and other passengers from bodily injury losses caused by an uninsured or hit-and-run driver who is legally liable for the damages.

1. If you are involved in an accident with a person who does not have any liability insurance—even though the accident is *completely* that person's fault—you may have to assume your costs from the accident.
2. Uninsured motorist protection does for you what *bodily injury insurance* would have done if the other person had bought it ($10,000-$20,000 limit).
3. Uninsured motorist insurance pays you only what you were legally entitled to get but couldn't collect because the driver to blame was not insured.
4. A number of states have a financial responsibility law to help protect the public from the uninsured motorist. Under this law, if you are involved in an accident and do not have insurance, you will be required to put up a cash bond with the state treasurer to show that you are a financially responsible person. If you do not have insurance and do not put up the cash bond, your operator's license and plates are automatically revoked, regardless of fault. This law also sets minimum liability coverages which may be sold in the state.
5. A few states have a compulsory insurance law which changes the concept of insurance to protection of the public rather than the individual.

D. Automobile insurance plans (formerly known as assigned risk plans) are placement services developed by the insurance industry to help persons who have difficulty finding an auto liability insurer.

1. All of the auto insurers in a state agree to accept a share of the referrals made by these service facilities.
2. Under improved plans, when a company insures male drivers under age 25 through its regular underwriting procedures, its quota of referrals from this plan is reduced.

6.6 Many factors influence premiums for vehicle insurance.

A. The way you and the other people in your city, county and state drive has a lot to do with how much you pay.

1. Accident experience in a region is a major factor in determining rates. Without accidents there would be no injuries, repairs or damages for the insurance company to meet, and the individual to pay through higher premiums.
2. Based on the accident experience of various groups or classes of drivers, insurance companies have devised rating scales for setting premium rates (age, sex, type of car, occupation, type of driving, where the car is garaged, and the previous driving records of vehicle's principal drivers).
3. Some companies use merit rating—a plan which reduces the cost of insurance when there are no accidents but increases the cost for each accident.
4. One accident, whether or not you are legally at fault, can increase a $150 insurance premium by 100 percent or more.
5. As a practical matter, it is not possible for an insurance company to devise an individual rate for each motorist.

B. The cost of repairs, a determinant of automobile insurance premiums, is influenced by:

1. rising costs of labor and replacement parts for vehicles;
2. the *integrity* of vehicle owners involved in accidents and the garage mechanics who repair the vehicle (those who pad repair bills are cheating the policyholders who do not cheat); and
3. fake claims.

C. The number of court judgments also influences vehicle insurance premiums.
   1. Many cases are settled out of court, but of those that are tried some result in judgments in the hundreds of thousands of dollars. (All policyholders help to pay this.)
   2. To get more accident victims paid quickly and equitably, and to eliminate many of the irritants and controversy associated with the present system, various experimental plans are being conceived and tried.

D. Insurance companies are closely regulated by state insurance departments, and this regulation includes approving or not approving the rates each company wants to charge.

6.7 Young drivers, as a group, are involved in more than their share of accidents. This is reflected in the insurance premiums for them.

A. When parents simply let their children drive the family car, they can insure them as an occasional driver under their policy.

B. After a few years of good driving experience in the family car, young drivers usually can obtain coverages on a vehicle of their own without difficulty.

C. If young people are given or allowed to purchase their own vehicles at age 16 or 17, they will have some difficulty obtaining insurance.

D. Many insurance companies have refined their rate classifications for male drivers under 25 and female drivers under 21 to provide a better matching of premiums and loss expense, making young drivers more insurable. (Some companies are using psychological tests in an effort to make insurance more readily available to young operators who are mature in their driving attitudes.)

E. Some insurance companies provide a reduction in auto insurance premiums for students with an A or B grade average or the equivalent. This plan is based on the assumptions that:
   1. high achievers in school display a degree of maturity and conscientiousness which is bound to affect their driving habits favorably, and
   2. the successful student must spend considerable time studying and consequently less time on the highway.

F. Many insurance companies offer lower premiums to drivers under 25 who have successfully completed an approved driver education course.

Pre/Post Assessment

Financial Responsibility

1. All people who are insured are helping to pay for each other's losses.
   _____True _____False

2. Fake claims can increase the cost of insurance for everyone.
   _____True _____False

3. A person causing injury to another person can be held responsible in both criminal and civil actions.
   _____True_____False

4. Proof of insurance is required before you can license a car.
   _____True _____False

5. Better students are usually able to get better insurance premiums.
   _____True _____False

6. A student may have to pay the costs of poor driving or an accident for many years in the form of higher premiums.
   _____True _____False

7. One accident might increase an insurance premium by 100 percent.
   _____True _____False

8. Property damage liability insurance protects you for the damage
   _____A. done to your car by another driver.
   _____B. done by yourself to your own car.
   _____C. your car does to the property of another.
   _____D. done to your property (excluding your car).

9. Liability insurance protects you
   _____A. if you are liable for damages.
   _____B. for injuries caused by other drivers.
   _____C. from uninsured motorists.
   _____D. from being found liable for damages.

10. Collision insurance
    _____A. pays regardless of who caused the accident.
    _____B. pays for damages you do to another vehicle.
    _____C. protects your vehicle against damage you or others may cause.
    _____D. protects you when you drive a car belonging to someone else.

11. Comprehensive auto insurance
    _____A. protects your car from damage or loss to causes other than collision.
    _____B. is an all-around policy including all aspects of automobile insurance.
    _____C. is in reality no-fault insurance.
    _____D. includes medical payments if necessary.

Pre/Post Assessment Answers

Financial Responsibility

1. True
2. True
3. True
4. True
5. True
6. True
7. True
8. C
9. A
10. C
11. A

Appropriate Instructional Materials

Financial Responsibility

Films:
"No Fault Auto Insurance," Tribune Films, 38 W. 32nd St., New York, NY 10001 (free loan).

Filmstrip:
"Automobile Insurance," Insurance Information Institute, Educational Division, 110 William St., New York, NY 10038.

"Every Ten Minutes," pamphlet, Insurance Institute for Highway Safety, Watergate 600, Washington, D.C. 20037.

Textbook References

Drive Right.
pp. 274, 286-288 (1977)
pp. 320, 323 (1982)

Driver Education and Traffic Safety.
pp. 282-298

Driving: A Task Analysis Approach.
pp. 11, 239-243, 259, 271

Driving With Car Control.
pp. 211-220

In the Driver's Seat.
pp. 50, 269, 288, 291-292

Safe Performance Driving.
pp. 2, 338, 343, 348, 350, 372-373, 386, 392-394

Sportsmanlike Driving.
pp. 213-216, 298

Tomorrow's Drivers.
pp. 7, 71, 205-209

Section II:
Readiness Tasks

Unit A:
Operator Fitness

Concepts:

1.0	Alcohol
2.0	Drugs
3.0	Emotions
4.0	Fatigue and Carbon Monoxide
5.0	Other Impairments

Content

Learning Guides

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit A: Operator Fitness

1.0 Alcohol

Principle: Much is yet to be learned about underlying causes of traffic accidents, but the evidence is clear that alcohol is a frequent contributing factor, particularly in severe crashes. This proposed learning unit is designed to help young people to: (1) acquire accurate information about the problem, (2) examine and clarify their feelings and attitudes toward drinking and driving, (3) develop a realistic plan for handling social situations involving alcohol and driving, (4) recognize the need for effective legislation and enforcement.

1.1 Absorption, Distribution, and Oxidation

Objectives/ Student Behavior: Describe what happens to alcohol in the body from the time it is first ingested until it is eliminated.

Learning Activities: With the aid of charts, diagrams, slides, or other visual means, students will trace the path of alcohol through the body from ingestion to elimination.

1.2 Effect on Body Functions

Objectives/ Student Behavior: Given a list of body functions (speech, vision, judgment, coordination, etc.) in random order, arrange them in the sequence these functions would be impaired by increasing amounts of blood alcohol concentration.

Learning Activities: Discuss how alcohol affects the various areas of the body and the question of whether the effect is the same on all people. Discuss the psychological effects the use of alcohol has on people and how these relate to the driving task. Study Learning Guide 55.

1.3 Variables

Objectives/ Student Behavior: Identify: (1) individual differences which determine the manner and degree with which people are influenced by alcohol, and (2) the conditions which cause the same individual to be affected more at one time than another.

Learning Activities: Formulate a list of social pressures which lead to alcohol consumption, such as peer group acceptance, parental example.

1.4 Influence on Driving Performance

Objectives/ Student Behavior: Describe the effects of alcohol on the human functions involved in driving (identify, predict, decide and act), in the order that these effects are likely to occur as the concentration level of alcohol increases. In addition, explain why these effects are likely to be more pronounced in young people than in adults.

Learning Activities: Discuss how alcohol use would influence your driving ability.

1.5 Motivations—Decision

Objectives/ Student Behavior: Identify and appraise motivations that prompt young people to drink, and develop personal guidelines for behavior that will minimize the risks associated with drinking and driving.

Learning Activities: Formulate a list to arrive at ways to make drinking and driving less of a problem, such as calling a cab rather than driving. Discuss how a person can use alcoholic beverages and not be a driving problem.

1.6 Accident Data

Objectives/ Student Behavior: Compare the probability of problem drinkers and social drinkers being involved in highway collisions.

Learning Activities: Using statistical charts (state police, insurance companies, Department of Motor Vehicles, etc.), impress upon students the actual numerical and percentage figures that relate to accidents caused by drinking drivers.

1.7 Legislation and Enforcement

Objectives/ Student Behavior: Assess the potential of legislation and enforcement measures for reducing alcohol-induced highway accidents.

Learning Activities: Discuss the conditions under which a driver would be arrested for driving while intoxicated and the penalty:

1. alcohol content in blood (legal defintition in Montana and neighboring states),
2. tests used,
3. implied consent law,
4. presumptive DUI Law,
5. illegal pre se law, and
6. probable cause.

Content

1.0 Ethyl alcohol, found in several commonly consumed alcoholic beverages, impairs the human functions involved in operating a motor vehicle.

1.1 When ingested, alcohol is directly and quickly absorbed into the bloodstream through the lining of the digestive tract, carried by the blood to all parts of the body (including the brain), and finally oxidized or eliminated.

A. Alcohol does not have to be digested, as most other food must be, before reaching the blood stream.

B. The rate at which alcohol enters the bloodstream through the walls of the stomach and small intestine depends upon the:
1. rate at which alcohol is ingested,
2. total amount of alcohol involved,
3. other components of the drink (straight liquor is absorbed fastest of all; liquor diluted with water is absorbed most slowly), and
4. the characteristics and amounts of other foods and beverages also present in the stomach.

C. Alcohol is carried by the blood to all body tissues and distributed in proportion to the water content of the body material. (Weight of the person is a significant variable.)

D. Alcohol cannot be stored in the body for any length of time like some foods, but instead is circulated throughout the body until it is oxidized or eliminated.
1. Oxidation is a series of chemical changes that enables food to release energy.
2. Most oxidation takes place in the liver, which needs about 1 hour to burn up ½ ounce of pure alcohol.
3. A small percentage (5 to 10 percent) of the alcohol is eliminated by the kidneys, breath and sweat glands.

E. How much alcohol reaches the brain at one time is determined by how much the person drinks and how closely spaced those drinks are.

F. When the consumption of alcohol and its absorption in the body is faster than the oxidation rate, alcohol and its effects will "pile up."

G. The concentration or percent of alcohol in the blood at any given time can be measured accurately by blood, breath or urine analysis, but a rough guide for a 150-pound person is that each drink increases the concentration of alcohol in the blood by 0.02 percent.
1. The average drink of whiskey (1 ounce), wine (3½ ounces), and beer (12 ounces) all contain about one-half ounce of alcohol.
2. Liquors (rum, gin, vodka, brandy and whiskey) contain 40 to 50 percent alcohol; dessert to cocktail wines (ports and sherries) 18 to 21 percent; ordinary table wines up to 14 percent; and beer 4 percent.

1.2 As the alcohol concentration in the bloodstream builds up, body functions are affected.

A. In spite of deceptive outward signs (flushed face, animated behavior, etc.), alcohol operates as an anesthetic by deadening the nerve centers, and therefore is identified as a *physiological depressant.*
1. A person may feel gay and pepped up; nevertheless, the nervous system is being *depressed,* not stimulated.
2. Alcohol does not "step on the gas" for us (stimulant); it simply paralyzes the brakes (restraints).

B. Alcohol's paralyzing, numbing effect on the brain begins at the higher center (cerebrum) and moves toward the lower center (medulla) of activity, as the concentration of alcohol in the bloodstream increases. (The parts of the brain are affected in reverse order of their development.)
   1. First, the forelobes (cerebrum) of the brain are affected, resulting in decreased ability to reason and make judgments, weakened social inhibitions, and changed attitudes toward others.
   2. As the concentration increases, more of the forebrain is affected and, in addition, alcohol reaches the cerebellum which controls sensory-motor functions. The result is emotional instability, retarded responses, impaired vision and lack of coordination.
   3. At higher levels of concentration the person is unable to stand or walk, and then loses consciousness. Death results when all of the brain, the upper spinal column, the respiratory and heart control centers are anesthetized.

C. The effects of alcohol increase approximately as the square of the blood alcohol concentration (0.08 percent concentration is not twice as bad as 0.04 percent, but instead four times as bad).

1.3 Inherent, acquired and other factors cause differences in the manner and degree with which people are affected by alcohol.

A. Body weight, body chemistry, attitude toward drinking and drinking experience cause individual differences.

B. Fatigue, emotional state, food intake and drugs cause the same individual to be affected by alcohol more at one time than another. Some drugs when combined with alcohol produce effects that exceed the sum of the separate effects of each.

C. Aspirin, black coffee, cold showers and exercise have little influence in reversing the principal effects of alcohol.

1.4 All of the capabilities required to operate a motor vehicle are particularly susceptible to the effects of alcohol (identifying, predicting, deciding and executing).

A. The driving ability of most persons becomes impaired *before* they display *outward* signs of motor impairment, and other noticeable effects.

B. The insidious effect of alcohol on judgment and self control, even in the early stages, is particularly serious.
   1. Since self-criticism is affected early, the drinker often is unlikely to recognize any change in behavior.
   2. Even more serious is the likelihood that the drinker feels more perceptive and skillful, and, therefore, is likely to take more chances in passing, speeding or negotiating curves (self-confidence increases as skill decreases—the worst possible combination).

C. Reduced input of sensory data (effect on vision) plus diminished ability to identify and analyze the data which is absorbed (effect on reasoning center) combine to impair the driver's decision-making ability.

D. Responses are slowed and muscular coordination impaired due to alcohol's effect on the nerves which control the muscles. This could make a critical difference in stopping distance and the ability to maneuver the vehicle.

E. Those who have been drinking, especially heavily, are probably far less likely to follow sensible safety practices, such as signalling intentions, fastening seat belts and other normal precautions.

F. Some individuals drive time and again after drinking and do not have an accident, reinforcing their belief (misconception) that alcohol does not lead to greater danger on the highway.

G. Even though some individuals, after a few drinks, exceed the driving competence of other persons who have not consumed any alcohol, it behooves everyone to be at the optimum performance level when driving.

H. Alcohol is likely to affect driving performance of young drivers more than adults.
   1. The young person who drinks lacks experience in compensating for the effects of alcohol.
   2. The young driver is an inexperienced driver, hence skills are less automatic and more inclined to deteriorate from alcohol's effect.
   3. Risk-taking, especially strong in young people, may be accentuated by alcohol.
   4. On the average, the body weight of young people is less than adults.

1.5 Most young people drive and some young people drink, and the same individual will sometimes do both. (What will you do?)

A. An important part of the problem occurs when young people leave the social setting where drinking usually occurs and head for home or another social setting. (To be free of parents and the law, young people sometimes drink in automobiles.)

B. Various motivations prompt people (including youth) to drink, such as:
   1. *social pressures*—faced with the alternatives of being a good social "citizen" and drinking, or being a good traffic "citizen" and not drinking;
   2. *self-enhancement*—to demonstrate "maturity" or adulthood;
   3. *curiosity and experimentation;*
   4. *desire to relax and relieve anxieties* or *to celebrate a special occasion;* and
   5. *family custom.*

C. The responsible course of action in regard to drinking and driving is to:
   1. acquire accurate information about the effects of alcohol;
   2. analyze one's attitudes and feelings concerning the matter;
   3. develop strategies (mental sets) for handling social situations where drinking and driving are or could be involved.

D. The most intelligent alternative is to avoid the combination of drinking and driving, because the "gain" is not commensurate to the risk involved.

1.6 The immoderate use of alcohol is a major source of highway crashes, especially the most violent.

A. Alcohol contributes to about half of all highway deaths (higher in single-car fatalities) and to an appreciable percentage of the far more numerous non-fatal crashes.
   1. As the severity of the accident increases, the probability of alcohol being a contributing factor also increases.
   2. Fatal and other crashes of teenagers and young adults frequently involve hazardous amounts of alcohol.

B. Alcoholics and other problem drinkers, who constitute but a small minority of the general population, account for a very large part of the overall problem.

C. The social drinker-driver is dangerous because:
   1. of sheer numbers;
   2. they are not so easy to spot and defend against;
   3. they fail to recognize their limitations.

D. The probability of being in a crash increases sharply as the amount of alcohol in the blood increases.
   1. There is a difference of opinion between experts as to the extent of crash likelihood in a blood alcohol content below 0.05 percent.
   2. Evidence is clear that the likelihood of crash involvement increases at about 0.05 percent level and becomes progressively and disproportionately higher at higher concentrations.
   3. The higher a driver's blood alcohol concentration: (a) the disproportionately greater is the likelihood a crash will result; (b) the greater the likelihood that the drinker/driver will have initiated the crash; and (c) the greater is the likelihood that the crash will have been severe.

E. The association between blood alcohol levels and pedestrian accidents very closely parallels the findings in the studies of drivers (limited evidence).

1.7 Evidence supports the need for effective legislation and enforcement action to reduce the probability of alcohol-induced highway accidents.

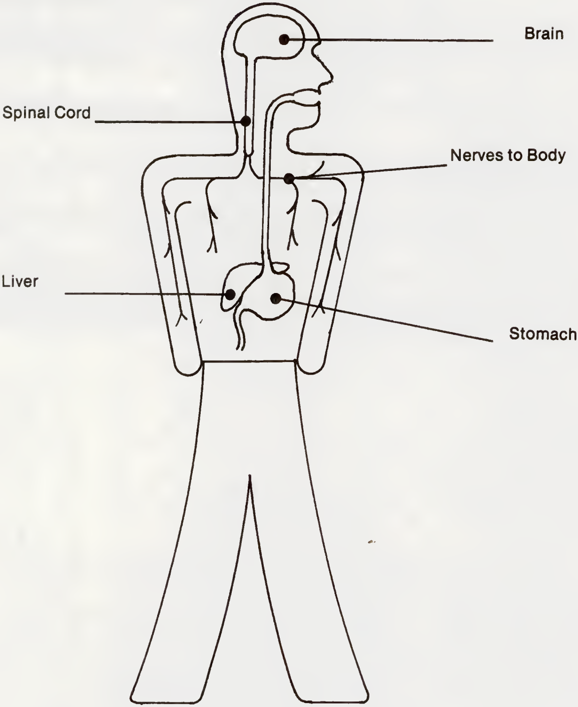
A. A vehicle on the highway is no longer an individual responsibility; it is also a community responsibility. Impaired drivers are a threat, not only to themselves, but also to all those with whom they interact on the highway.

B. All states have adopted legislation designed to control the drinking and driving problem. (These laws change rapidly, so current Montana laws should be identified.)

C. The most effective combination of enforcement and education will be one that preconditions the individual to set limlts on drinking and driving behavior even before taking the first drink.

Learning Guide 55

Areas Affected by Alcoholic Drink



Pre/Post Assessment

Alcohol

1. Drinking coffee or eating food is an effective way of sobering up before driving.
   _____True _____False

2. Some people are better drivers after a couple of drinks because then they purposely drive more carefully.
   _____True _____False

3. Alcohol increases sharpness of vision and quickness of reaction.
   _____True _____False

4. Two or three drinks can reduce your efficiency and coordination in operating a machine.
   _____True _____False

5. The chemical action of alcohol on your nervous system is the same as the action of ether or other anesthetics.
   _____True _____False

6. Loss of judgment and the ability of self-criticism may occur in an individual before obvious symptoms of intoxication appear.
   _____True _____False

7. Alcohol is a stimulant.
   _____True _____False

8. How does alcohol affect the human body?
   _____A. It speeds up body reaction.
   _____B. It slows down body reaction.
   _____C. It has no effect on body reaction.

9. Concerning alcohol intoxication and driving, which of the following is true?
   _____A. You are not under the influence of the alcohol until you are drunk.
   _____B. You are under the influence at very low concentrations.
   _____C. A few drinks will not have any influence on you.

10. What percent of highway accidents could be avoided if people didn't drink?
    _____A. 15-20 percent
    _____B. 25-35 percent
    _____C. 45-55 percent
    _____D. 60-70 percent

Pre/Post Assessment Answers

Alcohol

1. False
2. False
3. False
4. True
5. True
6. True
7. False
8. B
9. B
10. C

Appropriate Instructional Materials

Alcohol

It is strongly recommended that the teacher reference the publication *Drinking, Driving and Deciding: An Alcohol Module for Traffic Safety Education,* printed and made available by the Montana Office of Public Instruction, Traffic Education Programs, State Capitol, Helena, MT 59620. This publication identifies the appropriate instructional materials for this concept.

Textbook References

Drive Right.
pp. 282-289 (1977)
pp. 266-278 (1982)

Driver Education and Traffic Safety.
pp. 86, 222-227, 318

Driving: A Task Analysis Approach.
pp. 14, 107, 194-200

Driving With Car Control.
pp. 117-118, 228

In the Driver's Seat.
pp. 25-28, 51

Safe Performance Driving.
pp. 263-267, 426

Sportsmanlike Driving.
pp. 126, 273-282

Unit A: Operator Fitness

2.0 Drugs

Principle: Drug use and abuse is increasing at an alarming rate, and the people involved are driving motor vehicles. Some of these individuals fail to understand the drug-driving hazard, while others possess the knowledge and decide to assume the risk. In any case, the problem is a challenge to the educational process, and traffic education offers an excellent opportunity to inform young people about the effects and possible consequences of combining drugs with driving. This concept responds to that challenge.

2.1 General Types

Objectives/ Student Behavior: Define the two general types of drugs (prescription and non-prescription) and indicate how either type can be a factor in highway safety.

Learning Activities: Discuss the possible side effects of the use of "over the counter" drugs (cold tablets, etc.) and prescription drugs and how they affect the body and in turn the driving task.

2.2 Drugs and Medicines

Objectives/ Student Behavior: Classify specific kinds of drugs, their effects on body functions, and possible consequences for the motor vehicle operator.

Learning Activities: List the various classifications of drugs such as amphetamines, barbiturates, narcotics, etc., and the effect each classification has on the human body.

2.3 Guidelines

Objectives: Student Behavior: Formulate a set of personal guidelines for avoiding harmful highway consequences from drug misuse.

Learning Activities: Help students formulate a list of reasons why people take drugs. Have students present their own views on drugs and driving.

Content

2.0 Drugs and driving do not mix.

2.1 Drugs work on the body in many different ways.

A. Over the counter drugs do not require a prescription.

B. Many of these drugs can cause drowsiness.

C. Read all labels; many will say not to use when driving.

D. When possible, ask the pharmacist about the side effects of a drug.

E. Another group of drugs can be dispensed only on a doctor's prescription.
   1. The doctor indicates directions for use to you or the druggist. These directions should be followed exactly, not only to accomplish their purpose, but also to prevent dangerous side effects.
   2. The brain is the first organ in the body affected by drugs used in excess of directions. Ability to function, to be alert, to see and prevent danger is often destroyed.

2.2 Different drugs have different effects on body functions—all detrimental to driving performance.

A. Narcotics (morphine, cocaine and heroin) are very powerful and dangerous drugs.
   1. In extreme cases, they are prescribed by a physician to relieve pain in disease, trauma and burns.
   2. They have a depressant effect on the central nervous system which produces drowsiness, inability to concentrate, impaired vision, and sluggishness, but at the same time they provide a feeling of well being (euphoria) or apathy.
   3. Usually narcotics are habit forming and furthermore, when the supply is cut off, serious and painful withdrawal symptoms may develop.
   4. Drug addicts also drive automobiles, and the hazards are rather obvious.

B. Hallucinogens are very powerful and can distort time and space relationships.

C. Marijuana ("reefers," "pot," "loco weed"), a natural drug rolled in cigarette paper and smoked, produces effects in the user particularly dangerous when operating a motor vehicle.
   1. In the early stages, the user may appear animated and hysterical, while in the later stages sleepiness and stupor result.
   2. A person who becomes psychologically dependent and takes a heavy dosage may experience hallucinations, and the mood may swing from joy to extreme fear or panic.
   3. Marijuana intoxication does not impair motor coordination so rapidly, so a user may operate a car while concepts of time and space (depth perception) are radically distorted.

D. Amphetamines ("bennies," "pep pills," "co-pilots") are useful in treating certain illnesses and for controlling obesity, when used under medical supervision, but when carelessly used can be a threat to highway safety.
   1. They have a stimulating effect on the nervous system, increasing alertness and efficiency for a short time, but can lead to aggression.
   2. Temporary effect may be followed by headache, dizziness, irritability, decreased ability to concentrate, and marked fatigue.
   3. Operators may see things in the road that are not really there—mirages or hallucinations.
   4. Operators need to consider that excessive unsupervised use interferes with the body's normal protective symptoms of drowsiness and fatigue (feeling of exhaustion is short circuited), causing the driver to use up the reserve of body energy until a total and sudden collapse may occur.
   5. Legally, amphetamines can be sold only in drug stores, upon a doctor's prescription, but they are "bootlegged" and sold for enormous profit to truck drivers and young persons to keep awake.

E. Barbiturates (sleeping pills, "goof balls," "candy," "barbs," etc.) are useful medicines to calm nervousness and produce sleep in persons with medical problems. However, uncontrolled use can lead to serious consequences.
   1. They are habit forming and sometimes lead to addiction to true narcotics; therefore, they may not be sold legally without prescription (pushed by underworld peddlers for this reason).
   2. The natural tolerance for barbiturates varies from one person to another (greater tolerance does not preclude addiction).
   3. Excessive use produces symptoms similar in some respects to alcoholic intoxication (drowsiness, confusion, inability to coordinate muscular actions, difficulty in thinking or talking clearly).
   4. Even the occasional user will become drowsy and less alert. This reduces the drivers' ability to identify, predict, decide and act.
   5. They should never be used except under a doctor's instructions, and never while driving.

F. Tranquilizer identifies a group of preparations that are muscle relaxants, affecting some reflexes to relieve mental apprehension (attitude and outlook).
   1. Relatively mild compared to barbiturates but if excessive dosages are used repreatedly, they can result in sedation to the point of dizziness, drowsiness and blurred vision.
   2. Physical dependence can develop if used excessively.
   3. Fall under the federal prescription drug laws, although some preparations are compounded with other substances to contain a small amount of tranquilizer and sold without prescription.
   4. Even those sold over the counter, such as inhalers, may have such a depressant effect on the central nevous system that driving performance will be dangerously impaired.
   5. Particularly dangerous when used along with other drugs or alcohol (synergetic effects).

G. Antihistamines which are used for relief of nasal congestion due to colds, to combat allergies and for other purposes can also seriously impair one's ability to operate a motor vehicle.
   1. Have a depressant effect on the central nervous system.
   2. May cause side effects such as inattention, confusion and drowsiness.
   3. Effects vary from person to person and are rather unpredictable (one person feels nothing; one is overcome with the desire to sleep; and one suffers genuine hallucinations).
   4. Some preparations containing a quantity of antihistamines compounded with other substances may be sold without prescription (Contac, Dristan, etc., are examples).

H. A number of other drugs now available, and others being developed, need to be used intelligently or in some cases avoided entirely by highway users.
   1. Dramamine, a widely prescribed product for motion sickness, may cause drowsiness, dull mental alertness, and slow down reaction time.
   2. Penicillin and sulfanilamides may cause abnormal and violent reactions (Streptomycin is particularly bad).
   3. Reducing preparations may cause dizziness and drowsiness.
   4. Glue sniffing produces immediate symptoms similar to those associated with alcohol intoxication, while a second stage produces drowsiness, stupor, or, in some cases, unconsciousness.
   5. LSD and other hallucinogens primarily affect the central nervous system, producing changes in mood and behavior, and upsetting the user's perception of reality (perceptual changes involve senses of sight, hearing, touch, body-image and time).

2.3 There is little scientific evidence as to the extent to which drugs and medicine (with the exception of alcohol) contribute to the prevention or cause of highway accidents, but simple analysis tells us that uncontrolled use can be harmful to the health of the user and make it unsafe to operate a motor vehicle.

A. Under medical supervision, drugs are useful in treating certain illnesses, but about one-half of the millions of capsules and tablets manufactured annually are sold illegally (organized crime rings bootleg them).

B. The effect of drugs does not in itself cause automobile accidents, but they may cause a change in the physiological state of an individual that would impair the ability to safely operate a motor vehicle.

C. Some people use drugs for their "side effects" or for reasons other than their intended purposes. (Drivers use them to stay awake.)

D. The effect of drugs and alcohol in combination equals more than "one-plus-one," and this is true also of other combinations of drugs. (One drug intensifies the effects of the other in a synergetic effect.)

E. Drugs, like alcohol, first affect the higher brain and nerve centers which control reason, judgment, self-control, and normal inhibitions, and as a result render the person incapable of evaluating fitness for driving.

F. What you do about drug use and driving is an individual matter, but the responsible person considers the consequences of misuse and avoids any combination of drugs and driving that cause a foolish risk to oneself and others.

Pre/Post Assessment

Drugs

1. People have used, and abused, innumerable drugs throughout the ages.
   _____True _____False

2. When drugs are abused, they can cause illness and shorten life.
   _____True _____False

3. Research has shown that many different kinds of medicines can affect the way we handle the driving task.
   _____True _____False

4. Many drug users are heedless of the possible emotional and social consequences as well as the potential dangers of misusing drugs.
   _____True _____False

5. Drug users are "accident prone" while under the influence of drugs.
   _____True _____False

6. Which of the following is true concerning over the counter drugs?
   _____A. Their potential to cause problems when driving is limited.
   _____B. They can cause as much trouble as prescription drugs.
   _____C. There are no chemicals in them that would influence driving ability.
   _____D. All of the above are true.

7. Which of the following brain functions would be the first influenced by alcohol?
   _____A. Breathing
   _____B. Reason and self-control
   _____C. Muscle coordination
   _____D. Vision

8. Which of the following drugs would a long-distance truck driver most likely use?
   _____A. Narcotics
   _____B. Barbiturates
   _____C. Marijuana
   _____D. Amphetamines

Pre/Post Assessment Answers

Drugs

1. True
2. True
3. True
4. True
5. True
6. B
7. B
8. D

Appropriate Instructional Materials
Drugs

Pamphlets:

"Drug Abuse" Pamphlet, American Association of Sheriffs, Possees and Riding Clubs, Box 2895, Dallas, TX 75221.

"LSD-The Up & Down Drug," "Marijuana," Pamphlet, U.S. Department of Health, 330 Independence Ave. S.W., Washington, D.C. 20003.

"Drug Abuse: The Chemical Cop-Out," Montana Physicians Service, Box 1627, Helena, MT 59601.

"Drug Taking in Youth," U.S. Government Printing Office.

"Answer to the Most Frequently Asked Questions About Drug Abuse," National Clearinghouse for Drug Abuse Information, P.O. Box 1701, Washington, D.C. 20013.

Films:
"Darkness, Darkness," "Glass House," "LSD or Trap," "SCAG," "Acid," "Ups & Downs," "Up Pill, Down Pill," "Keep Off the Grass," "Heroin," Montana State Film Library.

Textbook References

Drive Right.
pp. 290-291 (1977)
pp. 275-278 (1982)

Driver Education and Traffic Safety.
pp. 227-231

Driving: A Task Analysis Approach.
pp. 14, 107, 199-201

Driving With Car Control.
pp. 228

In the Driver's Seat.
pp. 23-39

Safe Performance Driving.
pp. 267-269, 426

Sportsmanlike Driving.
pp. 270-273

Tomorrow's Drivers.
pp. 159-166

Unit A: Operator Fitness

3.0 Emotions

Principle: How we respond to the traffic environment depends somewhat on the emotional state and preparation that we take with us to the driving task, along with the reason (motivation) for that particular mission. Furthermore, the driving environment is replete with frustrating situations which can induce strong emotions, such as actions of other highway users, roadway factors, traffic laws and enforcement. In any case the driver needs to learn how to cope with these frustrations so that the frequency and strength of the disturbance is minimized. This concept is directed to that end.

3.1 Emotions and Driving

Objectives/ Student Behavior: Summarize the nature and effects of emotions on motor vehicle operators. Students will list four emotions which could affect a driver, and solutions to minimize them.

Learning Activities: Instructor will aid students in formulating a list of emotions which affect the driving task, i.e., fear, anger, frustration, impatience, etc. Instructor will conduct discussion of how emotions of various types affect the driving task, using specific situations such as an argument with parents, a fight with girl/boyfriend, Impatience to get to a big game.

3.2 Handling Emotions

Objectives/ Student Behavior: The students will formulate personal guidelines for anticipating and handling situations likely to induce strong emotions and unsafe behavior.

Learning Activities: Formulate a list of emotions that influence driving.

3.3 Motivations for Driving

Objectives/ Student Behavior: Classify the needs operators try to satisfy on the highway (other than transportation). Indicate the type of behavior likely to be induced by these needs. Suggest alternative means of satisfying the same needs that would be safer and more productive.

Content

3.0 Through self-discipline and self-control the operator can protect oneself and others from the detrimental effects of strong emotions and inappropriate motivations for driving.

3.1 Emotions (fear, love, hate, anxiety, joy, excitement) have profound affect on behavior in general and driving in particular.

A. A single emotion is a strong feeling of one sort or another typically involving both mental and physical responses.
   1. Emotions, like alcohol, effect the part of the brain which controls thought, reason and judgment (cerebrum).
   2. Strong emotions affect certain bodily changes, heart beats faster, face flushes, breathing speeds up, blood pressure rises and muscles become tense.
   3. Repeated extreme emotion may affect digestion and appetite, cause chemical changes, and lead to ulcers.

B. Most emotions are temporary, but emotional habits sometimes develop from our experiences, causing us to act the same way over and over again (temperament).

C. The mental state that the driver brings to the driving task frequently influences performance. The driver may be:
   1. worried about an examination;
   2. depressed or elated about the outcome of an athletic contest;
   3. upset about an argument with a girl/boyfriend; or
   4. angry because of a restriction imposed by a parent or teacher.

D. The distracting and paralyzing effect of strong emotions, regardless of whether they originated before or during the trip, can:
   1. dim or "blind" our powers of observation;
   2. delay or distort our ability to interpret events;
   3. reduce our powers to assess and predict the actions of other highway users;
   4. produce faulty judgment and high risk decisions; and
   5. adversely affect ability to perform precise and properly timed skills.

E. Emotions are contagious and can influence others. You become angry, causing another driver to become angry, who in turn passes the anger on to someone else—setting up a chain reaction.

F. Emotions can be a positive force toward determining our driving behavior:
   1. Reasoned fear of an accident or legal punishment helps to restrain unsafe tendencies.
   2. Love that a person has for family and friends can motivate a person to drive safely.

G. There are no laws on controlling emotions, but laws do relate to certain behavior which results from uncontrolled emotions (speeding, failure to yield, etc.).

H. The development of the reasoning and emotional centers of the brain is a lifelong process, and young people are in the early stage of the development.
   1. Young people are inclined to be more erratic in temperament, more subject to extremes, and more likely to let their emotions drive the vehicle.
   2. However, emotional maturity is not necessarily related to chronological age.

3.2 Accident potential is not related to the degree to which operators are beset by emotional problems (emotional upsets are an inevitable and natural consequence of living), but rather to the effectiveness of the methods by which they handle or cope with these problems.

A. Driving proficiency can be increased by developing the habit of evaluating our emotional fitness to drive and:
   1. putting aside those problems which tend to distract our attention from the driving task (admittedly, this is difficult);
   2. waiting until the strength of the emotion subsides to a safe level before assuming the driving task (strong feeling cannot be quickly changed); and
   3. selecting an alternative means of reaching our destination, if emotions are so strong that we cannot control them sufficiently to perform the driving task safely.

B. We can minimize the hazard potential of traffic-induced frustrations by examining situations which are irritating and:
   1. insofar as possible avoid those situations by thoughtful trip planning; and
   2. acquire a mind set in advance on how you plan to handle frustrating situations.

C. By empathizing with other highway users we will be more likely to tolerate their mistakes and, therefore, less likely to become irritated.
   1. Realize that most of the mistakes we see other drivers make, we have committed at one time or another.
   2. Blaming the slow driver for making it "necessary" to pass on a curve is simply expressing the childish "look what you made me do" attitude.

D. We may be able to prevent a serious consequence by dissuading a friend or relative from driving when they are under severe emotional stress.

3.3 Motivation or reason for being on the highway influences a person's behavior as an operator.

A. In addition to serving as a means of transportation, the vehicle is used to satisfy personal needs, such as:
   1. freedom and escape from parental control;
   2. socialization and dating;
   3. to prove maturity (a symbol of growing up);
   4. to gain attention, power and influence;
   5. to explore and experiment; and
   6. to act out tensions. (Pouring your emotions through the accelerator pedal can really get you into trouble.)

B. With a few exceptions these motivations for driving are natural and healthy signs of the maturation process, but the operator must not permit the motivation for driving to interfere with proficiency to perform the task.
   1. The pleasure and exhilaration of driving increased by being with friends, could be seriously distracting to the operator.
   2. Frustration caused by unmet personal needs—status within a group, achievement and recognition, affection, etc.—can cause actions of aggression, hostility, impulsiveness, competitiveness and showing-off with the automobile as the instrument.
   3. To gain status and security within a preferred group, an individual will tend to drive in accord with the group norms related to driving.
   4. The knowledge that one has been entrusted with an adult responsibility can be a strong incentive to proper driving behavior.

Pre/Post Assessment

Emotions

1. Driving has a way to bring out the worst of our emotions.
   _____True _____False

2. Strong emotions can bring on bodily changes which in turn could influence driving.
   _____True _____False

3. A good idea to help in driving is to wait until the emotion subsides.
   _____True _____False

4. Concerning driving behavior:
   _____A. Emotions become contagious.
   _____B. Emotions can influence everyone's driving.
   _____C. Both are correct.
   _____D. None of the above are correct.

5. Emotions can be a positive force toward determining driving behavior through
   _____A. fear of an accident or fines.
   _____B. love for family makes safe driving desirable.
   _____C. Both of the above.
   _____D. None of the above.

6. Which of the following can affect your driving ability?
   _____A. Psychological problems
   _____B. Emotional problems
   _____C. Financial problems
   _____D. All of the above.

7. Our mental attitudes affect our driving abilities
   _____A. all the time.
   _____B. part of the time.
   _____C. never.

Pre/Post Assessment Answers

Emotions

1. True
2. True
3. True
4. C
5. C
6. D
7. A

Appropriate Instructional Materials
Emotions

Films:
"Jerks the Irk," MFA Insurance Co., Columbia, MO 65201 (free loan).

"Look Who's Driving," Aetna Life Insurance Co., 151 Farmington Ave., Hartford, CT 06115 (free loan).

"Personality Factors and the Driving Task," American Driver and Traffic Safety Education Association.

Textbook References

Drive Right.
pp. 260- 270-279 (1977)
pp. 256-259 (1982)

Driver Education and Traffic Safety.
pp. 233-240

Driving: A Task Analysis Approach.
pp. 14, 185, 190-191

In the Driver's Seat.
pp. 22

Safe Performance Driving.
pp. 216, 262, 263

Sportsmanlike Driving.
pp. 285-287

Tomorrow's Drivers.
pp. 158-159

Unit A: Operator Fitness

4.0 Fatigue and Carbon Monoxide

Principle: Fatigue (getting tired) is a natural built-in limitation of the body and is something that happens to everyone, everyday. Unfortunately, the effects impair a person's ability to perform the tasks associated with operating a motor vehicle. As a consequence of these two conditions, drivers are frequently compelled to make fatigue-driving decisions. This concept is designed to develop an awareness of the factors that should be considered when making these decisions. In addition, the concept will include the precautionary measures aimed at reducing the carbon monoxide hazard, and the reasons behind the measures.

4.1 Causes of Fatigue

Objectives/ Student Behavior: Identify the causes of fatigue. Students will identify factors which make up the physical fitness of a driver.

4.2 Effects of Fatigue

Objectives/ Student Behavior: Predict the effects of fatigue on human functions and operator performance.

Learning Activities: Discuss how a driver can help prevent fatigue.

4.3 Handling Fatigue

Objectives/ Student Behavior: Formulate personal guidelines for minimizing the danger of fatigue-induced accidents.

4.4 Carbon Monoxide

Objectives/ Student Behavior: Classify the source of carbon monoxide, the effects on body functions and operator performance, the conditions that increase the chances of carbon monoxide poisoning, and some precautionary measures.

Learning Activities: Complete Learning Guide 56.

Content

4.0 While the exact extent of their effects is difficult to assess, fatigue and carbon monoxide obviously interfere with driving performance and in some instances cause fatalities.

4.1 Fatigue is a complicated biologic reaction to prolonged or intense physical or mental activity.

A. Fatigue is induced not only by inadequate sleep or rest and physical work, but it can result also from extensive study and thought.

B. Psychological (emotional) stress or even boredom can also play an important part in causing fatigue or compounding a fatigue situation.

C. Fatigue accompanies illness because your body is using energy to get rid of the disease.

D. Sunglare is a major factor in eyestrain and helps to cause fatigue and drowsiness.

E. Overeating, alcohol, drugs, overheated car and carbon monoxide compound the effect of fatigue.

F. Driving is a learned skill which is affected by fatigue and, in addition, driving is an activity which makes you tired (particularly monotonous, uninterrupted driving).

4.2 Fatigue causes psychological changes which result in reduced performance by the systems of the body. This, in turn, impairs the operator's ability to function effectively.

A. Effects of fatigue on operator performance are similar to those of alcohol and drugs and frequently are associated with them.

B. Effects of fatigue are generalized throughout the body, causing:
1. narrowing of the visual field;
2. impairment of sensory acuity;
3. delayed and distorted perceptions (perceptual skills have been demonstrated to deteriorate more than motor skills after prolonged driving);
4. impaired judgment and prediction;
5. delayed decision-making and reactions; and
6. reduced control and timing of neuromuscular skills.

C. Because of these effects a fatigued operator is more likely to:
1. ignore or fail to recognize critical elements in the traffic environment;
2. be affected by glare;
3. misjudge the speed or distance of another vehicle;
4. take a chance in passing or some other rash move;
5. become irritable, discourteous and overreact to minor irritations; and
6. make a clumsy or impulsive action while maneuvering the vehicle.

D. Unfortunately, an operator may not recognize that driving skills have deteriorated from the effects of fatigue.

E. Fatigue, particularly when caused by sleep deprivation, is accompanied by drowsiness, the state of being "half asleep" or almost asleep. You may lapse into a state that resembles being on "automatic pilot," or a "zombie" effect.

F. Some drivers who are very tired get "foot heavy" and drive at excessive speeds without their immediate knowledge. On the other hand some slow down without realizing it to a dangerous or illegal speed on freeways and in tunnels.

G. In extreme fatigue, operators have been known to experience hallucinations and to swerve or brake suddenly to avoid obstacles perceived but not actually present.

H. Collisions involving a driver who has fallen asleep (sleeping is not always a voluntary activity) are usually characterized by no skid marks or evidence of evasive action prior to impact.

4.3 Certain measures can be used to delay the onset of fatigue while driving, to compensate for the effects of fatigue already present, or to respond to an extreme state of drowsiness.

A. Fatigue and drowsiness represent a fortunate warning to be heeded even though our arrival time will be delayed.

B. To help maintain mental alertness and avoid the onset of fatigue on long trips:
1. be well rested when starting the trip;
2. keep your eyes moving;
3. wear good quality sunglasses in bright sunlight;
4. avoid heavy foods and alcoholic beverages;
5. keep the vehicle well ventilated; and
6. stop periodically for rest and light exercise.

C. When extremely tired or drowsy, remind yourself that no date, no rendezvous with friends, no athletic contest, no destination of any kind is worth a gamble with death on the highway, so:
1. let someone else drive but make certain the other person is alert and wide awake; or
2. stop off the highway in a safe place, turn off the ignition, lock all doors, and take a nap as a temporary measure. (Most modern freeways have well protected rest areas and/or parking areas at restaurants and gasoline stations which are good places to nap.)

4.4 Carbon monoxide poisoning can be prevented by using what we know about the source and nature of the poison to protect ourselves from this danger while operating a motor vehicle.

A. The major source of carbon monoxide is automobile exhaust.
1. When fuel is incompletely burned, it gives rise to carbon monoxide.
2. An automobile engine produces enough carbon monoxide to make a closed garage deadly within 3-5 minutes.
3. Exhaust control devices now required on new cars have reduced carbon monoxide emissions.
4. Carbon monoxide from cigarette smoking in a closed automobile can reach a dangerous level.

B. Carbon monoxide causes oxygen starvation in the tissues.
1. By combining with the hemoglobin in the red corpuscles, it reduces the oxygen carrying capacity of the blood, causing tissue starvation.
2. Oxygen starvation affects the brain and heart and may cause death within minutes depending upon the concentration of carbon monoxide breathed into the lungs.

C. In addition to the concentration of carbon monoxide in the air, another major factor is the length of time a person is exposed.
1. Long exposure to low concentration is likely to be more serious than shorter exposure to a higher concentration (effect builds up).
2. As little as one part in one thousand parts of air breathed for 90 minutes can be fatal.
3. Repeated exposure to carbon monoxide results in increased susceptibility and can cause cumulative damage.

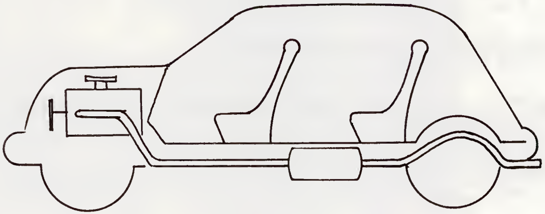
D. Carbon monoxide is not evident to the senses (colorless and odorless), so if the concentration is high a person might lose consciousness without any warning signs. On the other hand, the following symptoms may become apparent if the carbon/hemoglobin level builds up somewhat gradually.
   1. Tightness across the forehead followed by throbbing in the temples.
   2. Headache, weakness, dizziness, nausea, loss of muscular control and increased pulse and respiration rate.
   3. Symptoms multiply rapidly as the level increases resulting in dimness of vision, severe nausea, fainting, coma and finally death.

E. Carbon monoxide poisoning, of which most drivers would probably be unaware until it is too late, is a prime suspect in many automobile accidents.
   1. Carbon monoxide in the blood may aggravate or intensify normal driving fatigue and drowsiness, thus contributing to one-car accidents particularly.
   2. The amount of carbon monoxide in the blood of a driver is linked directly with increase in his reaction time and a drop-off in ability to judge time, distance or differences in speed between the car and another.
   3. Many people are found dead in parked automobiles usually with the ignition on, the gas tank empty, and the battery dead.

F. Certain weather, vehicular and driver conditions increase the chances of carbon monoxide poisoning.
   1. The danger of carbon monoxide poisoning is increased in hot humid weather.
   2. Snow around the car may "pocket" the gas and cause it to seep into the car.
   3. Children and adults with physical defects such as bronchitis, asthma, overweight, alcoholism or chronic ear disease are particularly susceptible to the effects of carbon monoxide.
   4. Poor ignition and faulty carburetor adjustment may be a factor.
   5. Loose exhaust pipe or manifold connections, a cracked exhaust manifold, a leaky muffler (a muffler can be leaky without being noisy) or tailpipe are prime sources of trouble.
   6. Engines from new cars produce as much carbon monoxide as old engines, but older cars are more likely to have leaks in the exhaust system.
   7. The slower the speed the greater the amount of carbon monoxide produced by automobiles. (Freeways during commuting hours are especially dangerous.)

G. If certain precautionary measures are followed, the danger of carbon monoxide poisoning is minimized.
   1. Keep a window partially open at all times for proper ventilation.
   2. Close air intakes temporarily when traveling in slow moving traffic or while driving through tunnels and shut off the engine when delays cause you to stop for longer than a minute.
   3. Always keep the garage door open when the vehicle is inside and the engine is running.
   4. Never drive with the car's trunk door open even slightly or with a station wagon's back glass down. (Suction can bring exhaust gas into your passenger compartment.)
   5. Replace muffler or tailpipe if clogged or damaged by corrosion. Have bent or broken exhaust tail pipe straightened, repaired or replaced.
   6. If any holes are drilled in the firewall to install accessories, be sure of adequate sealing.
   7. Children should not be placed on the car floor to sleep.

Learning Guide 56



Where, in the above drawing, is carbon monoxide likely to penetrate to the interior of the car?

Pre/Post Assessment

Fatigue and Carbon Monoxide

1. Sunglasses will help prevent fatigue of the eyes on bright days.
   _____True _____False

2. Carbon monoxide replaces oxygen going to the tissues.
   _____True _____False

3. Running an automobile in an enclosed garage for even a few minutes could prove fatal for someone inside the garage.
   _____True _____False

4. Carbon monoxide poisoning can be prevented by using a cloth over the mouth and nose.
   _____True _____False

5. Fatigue will diminish driving ability.
   _____True _____False

6. Alcohol will increase fatigue.
   _____True _____False

7. Smoking can greatly increase the carbon monoxide levels in the automobile which can hasten the onset of fatigue.
   _____True _____False

8. You are likely to experience fatigue from which of the following?
   _____A. Overeating
   _____B. Illness
   _____C. Overheated car
   _____D. Emotional stress
   _____E. All of the above

9. Which of the following would be best to prevent fatigue when driving on a long trip?
   _____A. Taking a rest stop every two hours.
   _____B. Take a stimulant drug.
   _____C. Drive with a window open and the radio on.
   _____D. Have something to eat.

10. Extreme fatigue could bring about which of the following?
    _____A. Irritability
    _____B. Hallucinations
    _____C. Impulsive actions
    _____D. All of the above

Pre/Post Assessment Answers

Fatigue and Carbon Monoxide

1. True
2. True
3. True
4. False
5. True
6. True
7. True
8. E
9. A
10. D

Appropriate Instructional Materials
Fatigue and Carbon Monoxide

"Are You Fit to Drive?" American Medical Association, 535 N. Dearborn St., Chicago, IL 60610.

Textbook References

Drive Right.
pp. 208, 261-262 (1977)
pp. 248-249 (1982)

Driver Education and Traffic Safety.
pp. 99-100, 208-220, 303

Driving: A Task Analysis Approach.
pp. 107-108, 186-187

In the Driver's Seat.
pp. 3, 18-23, 291, 303

Safe Performance Driving.
pp. 151,183, 194, 209, 216, 258, 268-269

Sportsmanlike Driving.
pp. 190, 283-285, 288, 292

Tomorrow's Drivers.
pp. 8, 145, 155-156

Unit A: Operator Fitness

5.0 Other Impairments

Principle: The extent of highway hazards created by physically and mentally unfit drivers depends largely on individual operators recognizing and compensating for their impairments. Handicapped people may still drive if, on the basis of a strong feeling of responsibility, they compensate for the handicap and adjust their driving to the degree of their proficiency. This philosophy is stressed in the concept so that the students are more likely to be tolerant, and thus more effective, as they interact on the highway with handicapped and aged drivers. Furthermore, a few young people in the class who already suffer from some disability will be encouraged.

5.1 Compensations for Handicaps

Objectives/ Student Behavior: Identify physical handicaps for which effective means of compensation are available (in motor vehicle operation).

5.2 Age Factors

Objectives/ Student Behavior: Summarize the major points related to the question, "How valid is calendar age as an index of driving competence?" Given a list of driving violations and errors, predict which ones are more likely to be committed by young drivers and those more likely to be committed by elderly drivers, with a statement to support each choice.

Learning Activities: The instructor will stimulate student discussion on the use of physical examination as a prerequisite for procurement and/or renewal of a driver's license.

5.3 Driver Licensing Standards

Objectives/ Student Behavior: Describe the problems and promising solutions related to physical and mental standards for driver licensing.

Content

5.0 In many cases, the handicaps imposed by a physical disability or the aging process can be compensated for so that the person can be considered "fit" to operate a motor vehicle.

5.1 A person free of physical defects is potentially a competent driver, but having a chronic disease or impairment does not necessarily signify any serious interference with the driving function.

A. Sometimes a compensating operator performs better than expected for a non-handicapped person. Reports from a number of states have indicated better driving records of persons with defective hearing as compared with normal hearing. Some possible explanations are that:
   1. proper seeing habits and well-developed perceptions of potential driving hazards are highly prevalent in deaf drivers;
   2. there is full concentration on driving with absence of radio and conversational distractions; and
   3. deaf drivers generally recognize more so than the great mass of hearing drivers that a driver license is a privilege to be respected and guarded.

B. Persons with recently acquired impairments lack the compensating or adjusting ability of those who have had the same impairments over a significant period of time. (Therefore, drive with considerable caution if you suddenly acquire a visual or hearing defect, an injury, or some other disability which interferes with driving performance.)

C. Some remarkable achievements have occurred in equipping the vehicles of orthopedically disabled persons so that they can drive safely. (Some drive with only their arms or only their feet.)

D. Medically controlled epileptics and diabetics perform adequately in virtually all activities of life, including driving.

E. If physical fitness were the only requisite for becoming a competent operator, the young driver would have the best record.

5.2 Young operators can increase their own safety and the safety of all highway users (particularly the elderly) through an awareness and appreciation of certain traffic-related realities associated with the aged driver.

A. The aging driver is a significant factor in traffic, and will steadily become a more important factor because the numbers are growing much faster than the total number of drivers.

B. Most older drivers want to continue driving as long as they are capable of safe driving (for the same reason as young drivers—independence), and public policy should be based on helping aging drivers continue to drive enjoyably and safely.

C. Chronological age is a poor index of aging and also of driving competence.
   1. The important yardstick is not the calendar age but the functional age of the individual.
   2. Some persons can still drive safely in all types of traffic at age 80, while others might be unable to drive safely at 60—both groups of drivers having been safe drivers at 50 years of age.
   3. Functional or pathological age (deterioration of the body) and calendar age do not run parallel, because pathological age is an individual characteristic.

D. Unquestionably, the physiological and behavioral changes which occur as we pass through life (particularly the latter part) impair our capability to function as highway users. On the other hand, the value of added experience and safety-mindedness tend to offset the deteriorating factors.

E. You rarely find older drivers and pedestrians consciously courting danger, speeding, or driving cars that are faulty to the point of danger, but you do find them caught up in unsafe situations and accidents caused by inefficient sensory-motor capabilities and unfamiliarity with modern highway facilities and traffic controls.
   1. Common errors of older drivers are improper turning, failure to give right-of-way, ignoring stop signs, and improper entering and leaving the highway.
   2. A high percentage of pedestrian fatalities are over 65 years of age.

F. Older persons are often surrounded by the hostility of youth for elderly authority and they tend to respond with hostility, hate, fear, or aggressiveness (which are not particularly conducive to safe driving).

G. The deterioration process of aging is so gradual that the effects may not be recognized, or the individual may recognize the limitations and fail to admit them for fear of losing driving privileges.

H. Young operators can help the situation by:
   1. empathizing with and compensating for elderly highway users (most of us will be there one day) so as not to compound their problems;
   2. tactfully educating elderly family members in regard to modern traffic conditions;
   3. helping authorities to remove the driving privilege from those who unreasonably endanger themselves and others by continuing to drive; and
   4. supporting efforts to protect the driving privilege of the many elderly drivers who continue to function efficiently.

5.3 Legislators and motor vehicle authorities, who are responsible for prescribing and implementing physical and mental standards for driver licensing, must rely on the cooperation of the medical profession and the general public.

A. One of the major obstacles to an effective driver licensing program is the difficulty of identification by licensing authorities of operators whose impairments make them unfit to drive.
   1. A person free of any significant impairment today may acquire a disability within a relatively short time thereafter. (A state of health is not constant.)
   2. There is a tendency on the part of operators to conceal a disability that might cause them to lose their driver's license or to have it restricted.
   3. Routine physical examinations, although quite revealing, are not infallible means of detecting conditions which will interfere with operator performance. (For example, epilepsy, mental disorders, cardiovascular disorders and many other health problems are difficult to identify in a routine examination.)
   4. Licensing authorities must communicate with and seek the cooperation of other state agencies who have already identified persons with disabling mental or physical health problems.
   5. Operator responsibility lies in responding accurately to questions by driver licensing officials related to the individual's medical history.
   6. Periodic re-examinations of drivers can help with the identification problem.

B. The medical profession can be an effective force in counseling individual patients and licensing authorities regarding operator fitness.
   1. A physician who examines or treats a patient is in the best position to know and advise that person about impairments which interfere with driving performance.
   2. The traditional doctor-patient relationship raises the question about doctors' responsibilities when they recognize disabilities in patients they know impairs their patients' ability to drive.
   3. In some jurisdictions, medical advisory boards have provided licensing authorities with professional medical knowledge to help authorities make administrative decisions related to licensing regulations.
   4. So little pertinent research has been done that, except in the case of glaring physical defects or gross deficiencies, it is not known which of the physical impairments, disabilities or diseases make an operator incompetent.
   5. The medical profession, given the resources, has the capability to acquire research-based knowledge of what should be included in the driver licensing examination and other standards. However, in the absence of any group of medical specialists trained to deal with the operator and tasks comparable to those developed for the pilot and flying, a rather permissive situation exists.

C. Driver licensing officials and the medical profession are limited in their ability to relate the driving privilege to the physical and mental condition of motor vehicle operators; therefore, the highway system will have to depend considerably on the individual operator to self-evaluate fitness and to take appropriate action to eliminate or compensate for the hazard caused by any deficiency.

D. Difficulties stand in the way of any needed official action restrictive of the driving privilege. It needs public support because legislators and the public at large are so directly affected by the action. (How much driving freedom are we willing to give up for safety?)

Pre/Post Assessment

Other Impairments

1. The aging driver will become an increasingly important factor in years to come.
   _____True _____False

2. A high percentage of pedestrian fatalities are 65 years of age.
   _____True _____False

3. About as many old as young drivers are fined for speeding.
   _____True _____False

4. Routine physical exams will pick up those conditions which would interfere with driving.
   _____True _____False

5. A number of drivers with a disability will conceal that disability so they can be licensed.
   _____True _____False

6. The better the physical fitness of the driver, the better the driver.
   _____True _____False

7. Concerning age and driving:
   _____A. all driver skills diminish with age.
   _____B. chronological age is a poor index of age and driving ability.
   _____C. the older age drivers have a higher percentage of accidents.
   _____D. vision actually improves with age.

8. Concerning the handicapped driver:
   _____A. generally speaking, they are not as good as the average driver.
   _____B. they can compensate for their handicaps and actually become better than average drivers.
   _____C. few handicapped people are able to get a licence.
   _____D. it is difficult for them to concentrate on the driving task.

9. The common errors of older drivers are:
   _____A. improper turning.
   _____B. failure to yield right-of-way.
   _____C. ignoring stop signs.
   _____D. all of the above.

10. The handicaps that would keep a person from driving are:
    _____A. epilepsy.
    _____B. diabetes
    _____C. color blindness.
    _____D. all of the above.
    _____E. none of the above.

Pre/Post Assessment Answers

Other Impairments

1. True
2. True
3. False
4. False
5. True
6. False
7. B
8. B
9. D
10. E

Textbook References

Other Impairments

Drive Right.
pp. 254-263 (1977)
pp. 244-250 (1982)

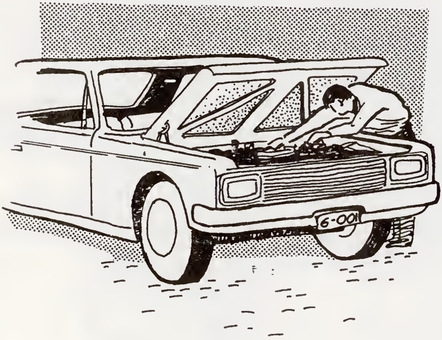
Driver Education and Traffic Safety.
pp. 101, 307-312

In the Driver's Seat.
pp. 3, 20, 291

Sportsmanlike Driving.
pp. 289, 292

Tomorrow's Drivers.
pp. 8, 154-158

Unit B:
Vehicle Readiness



Unit B:
Vehicle Readiness

Concepts:

1.0 Management and Maintenance

2.0 Energy Conservation

Content

Learning Guides

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit B. Vehicle Readiness

1.0 Management and Maintenance

Principle: This concept aims to increase the student's ability to make informed decisions about vehicle maintenance and selection. Major emphasis is placed on signs and symptoms of vehicle malfunction, probable cause and consequence if not corrected, and how to prevent the trouble in the first place. Attention is also given to safety and cost factors to be considered in selecting the most appropriate vehicle, and equipment options for a given set of objectives and operating conditions.

1.1 Owner Responsibility

Objectives/ Student Behavior: Students will be able to list reasons for properly maintaining a vehicle. They will formulate a program of vehicle maintenance for the family car and compile a safety check list and tell why each item is important.

Learning Activities: As a class project, have students check the family car and report to the class on their findings. Compile on board and discuss the results. Have a group discussion concerning the need for state/city-sponsored vehicle inspections. Could required safety inspections save lives of passengers and pedestrians? Who would pay for the inspections? Who could perform the inspections?

1.2 Signs and Symptoms

Objectives/ Student Behavior: Students will match various mechanical problems with the means of detecting the problem.

Learning Activities: Study Learning Guide 57.

1.3 Preventive Maintenance

Objectives/ Student Behavior: Given a list of vehicle components (cooling system, battery, tires, etc.), list the periodic checks that should be made to maintain efficient and economical operation.

Learning Activities: Study Learning Guide 58.

1.4 Operating Conditions

Objectives/ Student Behavior: Given various operating conditions, state the implications these conditions have for a vehicle maintenance schedule.

1.5 Choosing a Service Agency

Objectives/ Student Behavior: Formulate criteria and guidelines for selecting and dealing with a service agency.

Learning Activities: Discuss self-service and full service as a part of maintenance.

1.6 Vehicle Selection

Objectives/ Student Behavior: Given a case study of a young person with specified needs and resources who purchased a car, identify the good and bad decisions made by the purchaser (steering, brakes, power, style, cost, payments, etc.).

Learning Activities: Discuss financial aspects of owning a car.

1.7 Vehicle Title and Registration

Objectives/ Student Behavior: Students will define the importance of the title and registration for a motor vehicle.

Learning Activities: Discuss the purpose of the title and registration certificates.

Content

1.0 One mark of a competent vehicle owner is in the selection of an appropriate vehicle for specified needs and the preservation of its efficiency with preventive and corrective maintenance at minimum costs.

1.1 Each owner must assume responsibility for the vehicle maintenance; furthermore, it is advantageous to do so.

A. Assuming this responsibility is only common sense. Proper maintenance of the vehicle increases the probability of reaching your destination safely, conveniently and economically.

B. Letting your vehicle deteriorate can lead to:
1. poor performance,
2. breakdowns on the road,
3. accidents,
4. excessive repair bills,
5. less mileage per gallon of gasoline or quart of oil,
6. conviction for a traffic violation, and
7. lower resale value.

1.2 Vehicles seldom develop mechanical problems without giving some warning signs. Early identification and correction of these symptoms is important, just as it is with the human body.

A. The better you understand how a vehicle works, the easier it will be to recognize the first signs of trouble and describe them accurately to a mechanic so that problems can be tracked down.

B. Vehicle malfunctions can be detected by an abnormal "feel" in the control devices, by abnormal sounds and odors, and sometimes by visual means.
1. Engine troubles can be determined by the way in which the engine starts, idles, accelerates at various speeds or sounds; by excessive oil consumption, which usually indicates piston and ring defects; and by the color of exhaust smoke (black or blue smoke usually signifies the need for carburetor adjustment or engine overhaul).
2. Troubles related to engine temperature, oil pressure, battery charging can be observed on the warning lights or gauges.
3. Battery failure may come rather suddenly, resulting in the inability to start the engine.
4. The way the brake pedal feels (soft or spongy, hard pressure required, falls away under foot pressure), sounds (squeal, click, rattle, or chattering noise), or causes the vehicle to respond (grabbing brakes, pulling to one side, brakes heat-up or failure to release or to hold) becomes your "detector" of failure or malfunction.
5. Problems in the steering and suspension system are usually revealed through the steering wheel ("shimmy," free-play, pull to one side, hard steering, poor return from turns and temporary loss of power assist); by hard or rough riding qualities; by tire squeal on turns or other noises from the steering or suspension system; by one wheel sagging; or by irregular or abnormal tire wear.
6. Uneven or excessive tire wear may also indicate a need for correction in tire pressure or in driving habits.
7. Clutch and transmission problems are revealed through the "feel" of the clutch, by sounds and touch when shifting, by a noisy transmission, or by lubricant leaks from the transmission.
8. Some other signs signifying a problem that needs attention are oil or water leaks (detection on the carport or garage floor), poor gasoline and oil mileage, dim lights and irregular flashing of the turn signal.

1.3 Since instruments, gauges and other signs cannot warn of all trouble in advance, and since changes in vehicle performance may occur so gradually that the driver fails to recognize them, preventive maintenance is important.

A. Preventive maintenance is checking and correcting a vehicle's condition regularly so as to catch any signs of wear or damage before they can cause real trouble.

B. Brakes wear out so that the driver is hardly aware of it; shock absorbers gradually lose their effectiveness, causing the car to wander without the driver's recognition of the hazard; and exhaust systems can fail undetected, allowing carbon monoxide to permeate the vehicle creating a serious hazard.

C. To increase the safety and efficiency of an automobile, drivers should see that the following are checked periodically:
   1. Cooling system—coolant level and condition; radiator hose (hoses have a limited lifetime due to water and heat); and radiator grill for dirt, leaves and insects.
   2. Battery—electrolyte level; external condition of battery and cables for damage, cracks, warped case and corrosion (remove corrosion with soda solution and apply petroleum jelly on the post and cables to prevent further corrosion); battery carrier and hold-down clamps; and fan belt tension and condition.
   3. Tires, steering, and suspension systems—tire pressure (test and inflate when cold); condition of tires (wear, cuts and cracks, bulges, foreign objects between the treads); wheel lug bolts or nuts; shock absorbers for unequal resistance; wheel alignment and wheel balance.
   4. Brake system—linings; shoes; drums; master and wheel cylinders; and backen plates (mounting support for brake units; also keeps dirt out of the drum).
   5. Oil level and oil filters—correct oil level is at the FULL mark on the dip stick or slightly below; oil filter must be removed to see if dirt and sludge are present around the base of the refills. (The dip stick will not reveal the condition of the oil.)

D. Operators of two-wheeled vehicles should frequently check chain play and lubrication, clutch and brake cable adjustment and lubrication, tightness of nuts and bolts, signs of metal fatigue, tire inflation and condition, and wheel spoke adjustment.

E. The owner's manual for your car furnishes guidelines for determining the time and mileage spans for periodic checks and maintenance, particularly with respect to:
   1. engine oil requirements and changing oil filter;
   2. proper grade of gasoline;
   3. cleaning and replacing carburetor air filter (check for excessive dust, dirt and oil at points of entry);
   4. servicing air conditioning (if so equipped) and cooling system;
   5. power train maintenance;
   6. ignition system and spark plugs; and
   7. engine performance evaluation (tune up).

F. If the warranty on the vehicle systems is to be honored by the manufacturer, the owner must show proof that the maintenance schedule outlined in the owner's manual has been followed.

1.4 The kind of operating conditions make a difference in the need for vehicle maintenance.

A. Maintaining proper engine temperature (149° to 200° F) helps to throw off contamination of oil by acids and unburned gasoline. Proper engine temperature is facilitated by:
   1. a properly functioning engine thermostat;
   2. an open crankcase ventilating system; and
   3. avoiding short-trip driving and engine idling insofar as possible.

B. Oil change should be more frequent in colder weather, dusty climates and short-trip driving.

C. Brakes wear out faster if a car is driven around town since they are used more often than in open highway driving.

D. Tires are more likely to go flat in hot weather.

E. Freeway driving is a severe test for any potentially weak points in the mechanism of a vehicle (tires, fan belt, etc.).

F. Certain driving practices are costly in terms of gasoline consumption, wear of tires and damage to the car:
   1. excessive speed,
   2. quick starts and stops,
   3. turning too fast,
   4. racing the engine,
   5. improper gear selection,
   6. striking curbs, "chuckholes," and obstructions, and
   7. misuse of clutch (manual transmission).

1.5 A most important factor in your vehicle maintenance program is to choose a reliable service agency (automobile dealer, independent garage or gasoline station) with reliable mechanics; otherwise, you are going to spend money for repairs that are not needed or are not properly done.

A. Unless the operator is mechanically inclined, the ability to diagnose a car's ills, evaluate the proficiency of repairs, judge the reasonableness of repair costs, or otherwise exercise sound judgment concerning automotive repairs will be limited.

B. Just because a repair facility is associated with a dealership is no insurance of its competency, but the chances are that the dealer's mechanics will be better trained in the intricacies of that particular make than one who works for an independent garage or gasoline station.

C. Possible sources of information helpful in selecting reliable servicing are the local Chamber of Commerce, Better Business Bureau, your automobile insurance carrier, friends, neighbors and relatives.

D. Diagnostic centers, established to pinpoint a car's mechanical problems through the use of highly sophisticated electronic and mechanical testing equipment, are springing up rapidly. (Work can be done at any garage.)

E. Although most automobile mechanics are honest, evidence is mounting that the American public is being victimized to the tune of millions of dollars annually by auto repair racketeers. Common forms of these swindles are:
   1. padding the bills with unauthorized repairs;
   2. charging for parts which are never installed;
   3. outright shakedown of customers; and
   4. replacing whole units instead of components.

F. There is need for nationwide minimum standards for repair facilities and mechanics.

G. To protect yourself from being victimized by dishonest repair and service people:
   1. become familiar with what is under the hood of your car;
   2. never permit big repair jobs to be made without your consent;
   3. before work is begun, get the prices in writing for all repairs you have authorized (not always possible);
   4. avoid strange garages if you can, but if your car breaks down on the road check by phone with the nearest Better Business Bureau or Auto Club;
   5. ask in advance for the return of any parts replaced;
   6. whenever possible, tell the mechanic what is wrong; and
   7. demand an itemized bill.

H. Viewing the present and expected shortage of competent automobile mechanics, there appears to be a need for a "crash" program to meet the problem.

1.6 Many people pay more to own and operate a vehicle than they pay for housing or any other commodity, so it pays to be businesslike in selecting and owning a vehicle.

A. If a person purchases a vehicle beyond financial means, then money will not be available to take care of preventive maintenance.

B. The thoughtful buyer compares the capabilities and limitations of various equipment options in light of the objectives for purchasing the vehicle, driving conditions, safety, money available for initial purchase, and for operation and maintenance (engine type and size, manual vs. automatic transmission, air conditioning, power vs. disc brakes).

C. Knowing the telltale signs of good and bad used cars is essential when you "shop" for a used car. (If you are not familiar with what to look for, take someone with you who is.)

1.7 It is not lawful to drive a vehicle without a proper registration certificate and title.

A. All automobiles must be registered with the Department of Motor Vehicles.
   1. This should be completed as soon as possible after purchase.
   2. A copy of the registration certificate must be carried in the automobile at all times.
   3. A copy is also on file with the Registrar of Motor Vehicles.

B. Registration is a means of law enforcement.
   1. Proof of ownership is required before certificate is given.
   2. Proof of insurance is a requirement.
   3. Before a certificate is issued, all taxes must be paid.
   4. Registration certificates include both license number and serial number.

C. You must have a certificate of ownership or title for your vehicle.
   1. Titles are necessary to sell or trade a vehicle.
   2. When you borrow money to buy a vehicle, the bank will keep the title until it is paid for.
   3. Titles should be stored in a safe deposit box or some secure place.
   4. Duplicate copies of titles are on file with the Department of Motor Vehicles.

Learning Guide 57

Mechanical Problems

Symptoms of Mechanical Problems	Possible Problem
1. Shimmy in steering wheel.	
2. Excessive play in steering wheel.	
3. Tires worn on one side, middle, in spots.	
4. Whirring sound when starter is turned "on."	
5. Stuck turn indicator.	
6. Smell of exhaust.	
7. Smell of fuel.	

8. Rubbing sound when wheel turns.

____

9. Grating sound when brakes are applied.

____

10. Excessive bounce of vehicle.

____

11. Backfire.

____

12. Blue or black smoke.

____

13. Vehicle jerks when clutch is let out.

____

14. Tapping sound in engine, speeds up as engine speeds up.

____

15. Wet spot under vehicle.

____

Learning Guide 58

Safety Check

Tires
Pressure, cuts, bruises, smoothness

Steering
Pull to right or left, excessive play in wheel

Windshield
Keep clean (glare at night if dirty), tinted, clear of stickers, cracks

Brakes
Should not be closer than one inch from floor when depressed; brakes that grab cause car to swerve

Headlights and front signals
Keep clean, check bulbs, check lenses, have lamps adjusted periodically

Windshield wipers
Operate smoothly, no jerks; replace when they fail to wipe clean

Taillights, stop lights, and rear turn signals
Keep all these lights clean and operating

Horn
Understand usage of horn; to be used in emergency situations only

Exhaust system
Look for rusted-out places or holes; a defective system may allow deadly carbon monoxide to leak into vehicle

Mirrors
Adjust before starting; use to check traffic, lane changes, passing

Body condition
Dents, door(s) does not open, parts of vehicle missing, glass missing

Pre/Post Assessment

Management and Maintenance

1. In the cars of today there are gauges or instruments that will warn of any trouble in advance.
_____True _____False

2. When the automobile is mainly used around town, the brakes will wear out faster.
_____True _____False

3. Self-serve stations have contributed to a lower level of maintenance.
_____True _____False

4. When repairs are being done on your car, it is best to demand an itemized bill.
_____True _____False

5. To best protect yourself from buying a lemon used car, get to know the salesperson or dealer.
_____True _____False

6. Water and small oil spots on the garage floor are normal occurences.
_____True _____False

7. Select the statement that is least desirable.
_____A. Everyone should know some things about how a car operates and about essential services.
_____B. Seat belts and shoulder straps should be worn in town, even on short trips.
_____C. Money can be saved by not using service stations for oil, anti-freeze, air cleaner, tire and battery replacements.
_____D. Time can always be saved by not using toll roads and bridges.

8. What is the most important factor in keeping vehicles in a safe condition at all times?
_____A. Voluntary maintenance.
_____B. Inspection by state-owned stations.
_____C. Inspection by privately owned stations.
_____D. Federal safety legislation.

9. Not keeping up on maintenance could lead to which of the following?
_____A. Poor performance
_____B. Accidents
_____C. Poor fuel economy
_____D. All of the above

10. The best guide for determining periodic checks and maintenance procedures is
- _____A. a good mechanic.
- _____B. your parents.
- _____C. when performance goes down.
- _____D. the owner's manual.

11. Which of the following is the driver most likely to overlook in maintenance?
- _____A. Wiper blades.
- _____B. Shocks.
- _____C. Tires.
- _____D. Cooling system.

12. To best prevent being victimized by dishonest repair and service people
- _____A. become familiar with what's under the hood.
- _____B. make the mechanic give references of past work.
- _____C. stay and watch the work that is being done.
- _____D. ask another driver to suggest a good mechanic.

13. The main feature a buyer should look for when picking out an automobile is
- _____A. beauty.
- _____B. comfort.
- _____C. protection.
- _____D. utility.

Pre/Post Assessment Answers

Management and Maintenance

1. False
2. True
3. True
4. True
5. True
6. False
7. D
8. A
9. D
10. D
11. B
12. A
13. D

Appropriate Instructional Materials
Management and Maintenance

Films:
"How to Buy a Used Car," Chevrolet Division, General Motors Building, Detroit, MI 48202.

"How to Buy a Used Car," Bumpa-Tel, Inc.

"Facts About Car Care," Firestone Tire and Rubber Co., 1200 Firestone Parkway, Akron, OH 44317 (free).

Textbook References

Drive Right.
pp. 296-313, 316-320, 349 (1977)
pp. 280-282, 296-310 (1982)

Driver Education and Traffic Safety.
pp. 256-264, 266-280

Driving: A Task Analysis Approach.
pp. 13-14, 209-216

Driving With Car Control.
pp. 95, 170-210, 221

In the Driver's Seat.
pp. 51, 280-285, 289, 295-311

Safe Performance Driving.
pp. 12, 22-23, 196, 339, 353-367, 377, 386-391

Sportsmanlike Driving.
pp. 5-6, 100, 121, 124, 174-175, 181-192, 202-208, 305-308

Tomorrow's Drivers.
pp. 7, 183-190, 196-205

Unit B: Vehicle Readiness

2.0 Energy Conservation

Principle:	Petroleum products are an essential source of energy we can no longer afford to waste. The driver education program is an excellent place to initiate conservation habits as nearly three million students enroll in courses across the nation each year. The potential for fuel conservation among these new drivers is significant. An understanding of energy conservation as it relates to automobile driving is the first and most essential step toward the wise, not wasteful, use of precious fuel. The purpose of this concept is to develop that prerequisite understanding.

2.1 Fuel Conservation

Objectives/ Student Behavior:	Students will be able to identify factors which contribute to wasteful use of automotive fuel. They will summarize individual driver responsibility for fuel conservation.
Learning Activities:	Discuss national fuel savings benefits of reduced fuel consumption by individual drivers.

2.2 Determining Transportation Needs

Objectives/ Student Behavior:	Summarize the important factors to consider in selecting a fuel-efficient vehicle.
Learning Activities:	Compare luxury cars with economy cars. Can they successfully be combined into one?

2.3 Vehicle Fuel Economy Factors

Objectives/ Student Behavior:	Students will be able to describe fuel economy factors.
Learning Activities:	Discuss implications for fuel economy for vehicles with different weights, engine sizes and aerodynamic designs.

2.4 Fuel and Oil Selection

Objectives/ Student Behavior:	Formulate fuel economy guidelines for selection and use of fuel and engine oil.
Learning Activities:	Discuss synthetic versus regular oil.

2.5 Tire Care

Objectives/ Student Behavior:	List tire care procedures and factors that influence fuel economy.
Learning Activities:	Discuss how radial tires give better fuel economy.

2.6 Economic Driving Techniques

Objectives/ Student Behavior:	Students will be able to describe the best techniques for fuel-efficient driving.
Learning Activities:	Make a list of poor driving techniques for fuel economy. Place the list where other students can see it or take it home to parents.

2.7 Speed Management

Objectives/ Student Behavior:	Students will be able to describe the relationship of speed to fuel economy.
Learning Activities:	Discuss why the speed limit should be 55 mph.

Content

2.0 Passenger cars consume about one-seventh of all the energy and about one-third of all the petroleum used in the United States. Some of the fuel consumed is wasted needlessly. The driver is the prime factor in determining how much fuel a vehicle uses.

2.1 The private automobile is the single greatest user of petroleum in the transportation sector. We waste energy through careless use of our vehicles, through wasteful driving habits, improper maintenance, and inefficient trip planning.

A. The average amount of fuel used by all passenger vehicles is nearly 800 gallons annually (just over two gallons per day).

B. While miles per gallon range from about 10 to 50, average fuel use is 17 to 18 miles per gallon.
   1. Over one-third of the energy put into the fuel tank is put out through the exhaust pipe as heat.
   2. Private passenger cars are only about one-sixth as efficient as a city transit bus per gallon of fuel used.
   3. More than half of all auto trips are for less than five miles. Three quarters are for less than ten miles. On these trips the driver is usually alone in the vehicle.
   4. High speeds waste fuel. A subcompact car driven at a speed of 70 miles per hour will average about 40 percent fewer mpg than the same car driven at 55 mph.
   5. Some cars are inefficient due to their size and weight. A car weighing 3,800 pounds uses nearly twice as much fuel as one weighing 2,000 pounds, all other factors being the same.

C. An increase in the average passenger car's economy of just one mile per gallon or an average travel decrease of just two miles a day could reduce United States fuel consumption enough to save 125,000 barrels of oil per day.

D. If every driver reduced gasoline consumption just five percent, the total savings would be more than 5.5 billion gallons of fuel per year.

E. Fuel consumption can be cut without eliminating necessary travel and without inconvenience or sacrifice.
   1. Driving habits may be the most important single element in improving fuel economy.
   2. Improved fuel mileage can be achieved through fuel-efficient driving methods and fuel-saving driving techniques.
   3. Fuel efficiency is not always possible because of factors beyond the driver's control (weather conditions, traffic conditions, etc.).

F. While there are many fuel conservation factors beyond the driver's control, the driver can control the prime factors which determine how much fuel the vehicle uses. These driver control factors can be classified into five groups:
   1. proper vehicle care and maintenance,
   2. more efficient vehicle use,
   3. more skillful driving,
   4. planning ahead, and
   5. wise vehicle purchase decisions.

2.2 Some of the factors that will determine your vehicle purchase decision are individually subjective—style, make, comfort. Others are more objective—safety, dependability, economy. Considering these factors, then, the important thing is to choose the most fuel efficient vehicle that can meet your basic transportation needs.

A. To determine your vehicle needs, ask:
   1. Use—How will the vehicle be used each day?
   2. Accessories—Which accessories will be necessary?
   3. Cargo—How many people and what cargo will be carried on or in the vehicle each day?
   4. Mileage—What will its daily mileage be?
   5. Travel—Will the vehicle be used primarily for city or country driving?
   6. How much money can I afford to spend?

B. You can save hundreds of dollars a year at no sacrifice in mobility simply by choosing an economical car from the class of vehicles in which you are interested.

C. In general, the best fuel economy is associated with low vehicle weight, small engine, 4 or 5 speed manual transmission, low numerical axle ratio, and small frontal area.

D. The careful buyer utilizes the most complete and accurate information available on the relative fuel economy performance of all current model cars, station wagons, and light trucks.
   1. The U.S. Department of Energy has a Gas Mileage Guide developed for this purpose available free of charge at new car dealerships or by writing: Fuel Economy, Pueblo, CO 81009.
   2. Pertinent miles per gallon figures from the guide are also, by law, listed on all new cars.
   3. Estimates listed in the guide are in terms of miles per gallon (mpg) measured on the Environmental Protection Agency's (EPA) standardized fuel economy test.
   4. These tests are based on vehicles that are broken in and driven on level roads in warm, dry weather.
   5. A particular vehicle may not get the estimated mileage because of other factors involved (e.g., driving habits, vehicle condition, type of trip, road conditions, etc.).

2.3 In addition to determining your transportation needs and checking the mileage guides for mph ratings, there is a need to consider other vehicle specifications in the purchase of a new vehicle. All these specifications affect fuel consumption in some way.

A. Vehicle weight: The more a vehicle weighs, the harder the engine must work.
   1. For every 100 pounds of additional weight, fuel economy can be reduced by up to one mile per gallon.
   2. Both city and highway mileage are adversely affected by excess weight.
   3. Load in any vehicle can adversely affect miles per gallon.
   4. A compact car pulling a trailer may get worse mileage than a mid-size car under the same conditions because the mid-size car is better engineered to pull the load.

B. Aerodynamic design: Air resistance decreases fuel economy.
   1. The smaller the frontal area of a vehicle, the better fuel mileage it will tend to get.
   2. The faster the speed, the greater the air resistance and hence the greater loss of fuel. (Doubling the speed increases power demand by a factor of 8.)
   3. Permanent roof racks create additional air resistance.
   4. Pick-up trucks with the tailgate up have a higher wind resistance.

C. Engine size and type: The smallest engine that provides adequate performance (acceleration, hill climbing, trailer towing) will also provide the best fuel economy.
   1. Because conventional engines are most efficient when running at a high percentage of their full power, it is best to select the smallest engine that will meet your needs.
   2. A small engine in a small vehicle is usually more economical and fuel efficient, but heavy power options will decrease its mpg and increase fuel costs.
   3. A large engine in a small vehicle will use more fuel than necessary.
   4. Matching engine size with vehicle size will provide the best fuel economy: four cylinders for a small vehicle; six cylinders for a large vehicle; eight cylinders for a large vehicle that often carries heavy loads.
   5. In general, a 10 percent increase in the size of an engine increases fuel usage by 6 percent.

D. Diesel or turbo charged engines: These engines can offer an energy-saving alternative to conventional engines.
   1. Diesel engines can provide as much as a 25 percent increase in fuel economy over the same size gasoline engines. However, diesel engines may be more expensive to buy and maintain.
   2. A turbo-charger allows a smaller engine to have the power of a larger engine on demand, while providing more fuel efficient normal driving.

E. Transmissions: A manual transmission is generally more fuel efficient than an automatic transmission.
   1. A four-speed manual transmission can provide a fuel savings of 5 percent over a three-speed automatic—a five-speed even more.
   2. An unskilled driver in a manual transmission may consume a greater amount of fuel than with an automatic transmission by stalling, driving in the wrong gear, and revving the engine.
   3. New automatic transmissions are more fuel efficient than older ones because of improvements, such as torque converters and lower gear ratios.
   4. A torque converter can account for a 2-to-6 percent fuel saving over conventional automatics.
   5. An overdrive gear can improve fuel economy by as much as 9 percent for an automatic and 3 percent for a manual transmission if use is restricted to driving on flat, level roadways.

F. Vehicle axle: A low rear axle ratio is normally more fuel efficient than a high ratio because the engine needs to turn the drive shaft fewer times, and needs less fuel to power the vehicle.
   1. When a rear axle ratio was lowered 10 percent in a test situation, vehicle economy improved 2-to-4 percent.
   2. The lower the axle ratio, the less wear on the engine.

G. Power options: Power accessories such as windows, seats, roofs, and door locks are energy consuming.
   1. Accessories reduce your mpg by adding weight.
   2. Smaller cars have their gas mileage penalized more heavily than larger cars by power options because the added weight is a greater strain.
   3. Power steering can account for a 1 percent drop in fuel economy.

H. Air conditioning: Air conditioning adds weight to a vehicle and requires extra power to drive the compressor and fan.
   1. Air conditioning can cost 1-to-3 mpg in city driving.
   2. When driving cars at highway speeds, it may be more efficient to drive with the air conditioning running than to drive with the windows open. The drag created by air resistance can cause more fuel usage than an air conditioner.
   3. Cooling your vehicle with the assistance of your inside air vents can help to reduce air conditioner use.
   4. Installing an air conditioner cutoff switch that automatically disconnects the air conditioner during rapid acceleration can improve gas mileage by up to 4 percent.

I. Design options: Some special equipment in automobiles is made available to help improve fuel mileage.
   1. Tinted glass and light-colored interiors help cut down on heat inside the vehicle, thereby decreasing the need to operate the air conditioner or to roll down the windows.
   2. In a warm climate, a light-colored car that reflects the sun's rays will help keep the inside temperature down.

J. Few add-on devices for saving fuel have technical merit. Most fail to live up to their promises. There is one exception—a vacuum sensor, which is a device that enables the driver to monitor and control fuel efficiency.
   1. Vacuum sensing devices can be installed on new vehicle instrument panels as standard equipment or purchased as after-market equipment.
   2. These devices can be purchased (such as gauges, flashing lights and/or audible signals) to be installed on new or used vehicles.
   3. These instruments are small, relatively inexpensive and easily installed.
   4. They monitor the engine's intake manifold vacuum.
   5. The devices indicate when the driver is driving fuel efficiently.
   6. A low vacuum reading, a flashing light or sounds can warn the driver when fuel is being wasted.

K. By making simple maintenance checks on your vehicle, you can save fuel and prevent costly repairs. Your vehicle owner's manual should be used as a guide.
   1. A quick check to identify vehicle maintenance needs is to start your vehicle after it sits overnight, idle for 30 seconds, then drive away. The vehicle probably needs attention if it stalls, sputters, or hesitates.
   2. If performed when needed, a simple tune-up can improve your miles per gallon rate by 4-to-12 percent. Certain requirements are essential to the fuel efficiency of your vehicle.
   3. Keep the idle just high enough to run the engine smoothly; idle speeds that are too fast waste fuel while the vehicle is standing or whenever the accelerator is released and the engine idles.
   4. The air-fuel mixture should be adjusted to the manufacturer's specifications: too rich a mixture (excess fuel) will lower fuel efficiency; a too-lean mixture (excess air) can cause engine damage or failure.
   5. Spark timing must be set according to manufacturer's specifications.
   6. Clean, properly adjusted points will produce fuel efficient firing.
   7. An improperly gapped or defective spark plug is not always detectable in normal driving and can cause serious fuel loss.
   8. One spark plug misfiring half the time reduces fuel economy by 7 percent.
   9. If the PCV (positive crankcase ventilation) valve becomes clogged, it will unbalance the combustion mixture, resulting in poorer fuel economy and excess emissions. The PCV valve is inexpensive and easily checked.

2.4 The proper fuel and oil for your automobile may not necessarily be the most expensive.

A. A higher than necessary gasoline octane rating does not improve a vehicle's miles per gallon average.
   1. Use an octane level just high enough to prevent engine knocking.
   2. Using a higher than necessary octane rating does not substitute for keeping a vehicle's engine properly tuned.

B. Engine oil can make a difference in vehicle fuel economy.
   1. Engine oil that is too thick for your engine will resist flow and increase friction between engine parts; the more resistance your engine must overcome, the more fuel you will use.
   2. Use a good quality multi-viscosity oil that is marked with an "SE." Diesel engines require oil with an additional marking "CC."
   3. Multi-grade oils like 10W-30 and 10W-40 help to reduce internal engine friction and give better mileage than single-grade oils.
   4. For cold weather, a lower viscosity oil such as 5W-30 is recommended for gasoline engines and 10-30 for diesels.
   5. New modified or "slippery" oils are available that are designed to improve miles per gallon as much as 3-to-5 percent.

C. Keep a record of the miles you get from one gallon of fuel.
   1. Record the gallons or liters of fuel needed to fill the tank at each fill-up and also record the reading on the odometer.
   2. Miles per gallon or liter are obtained by dividing the number of miles traveled since the last fill-up by the gallons of fuel added to refill the tank.
   3. This procedure can also help the driver identify the need for an engine tune-up or other problem by identifying any drop in miles per gallon or liter.

D. Consider installing a vacuum sensor.
   1. A vacuum sensor can teach good driving habits by indicating a drop in the intake manifold vacuum. This indication is directly related to fuel-use efficiency. (Keep in mind that any vacuum sensing device that requires visual observation takes the driver's eyes from the road.) Department of Energy research indicates that the best vacuum sensor is one which provides an audible signal.

E. Buy fuel only when the fuel gauge shows a quarter tank or less.
   1. The practice of always keeping the fuel tank full or "topped-off" at all times is wasteful.
   2. The full fuel tank weight adversely affects fuel mileage.
   3. Complete fill-ups add to the chance of spillage.

2.5 The proper care of tires can increase miles per gallon of fuel and improve on-road safety.

A. Maximum fuel economy comes from maintaining tire pressure at the highest level of the recommended (owner's manual) range.
   1. In a random study, 80 percent of vehicles checked had tires that were not properly inflated.
   2. Most drivers can increase mpg by about 2 percent by keeping all tires at maximum pressure at all times.
   3. There is a fuel economy loss of 1 percent for every two pounds a tire is below recommended pressure due to rolling resistance, which is greatly influenced by underinflation. The penalty for increased rolling resistance is increased fuel consumption and fewer mpg.

B. Incorrect inflation causes unnecessary tire wear and adversely affects vehicle handling.

C. Check tire pressures regularly—at least once a month. (More frequently in fall and winter since tire pressure drops 1 lb. for each 10° in temperature drop.)
   1. Tire pressure should be checked while the tires are cold; heat causes the tire pressure reading to increase, thus giving an inaccurate reading.
   2. For best mileage, and for long driving trips with a heavy load, inflate tires up to the highest recommended pounds per square inch (PSI).
   3. Check tires with a good gauge (service station air tower gauges may not be accurate; studies show that 20 percent of these devices are inaccurate).

D. All tires should be checked visually before driving.

E. Radial tires give more miles per gallon than other types of tires.
   1. Warning: Do not mix radial tires with other types of tires because radials have radically different handling characteristics than conventional tires.

2.6 The way we drive has a major influence on fuel economy.

A. Each pump of the brake and accelerator pedal wastes fuel.
   1. Let up on the accelerator well in advance of a stop.

B. Anticipating conditions ahead buys time and space that will permit you to:
   1. maintain an efficient speed,
   2. make fewer and smaller speed adjustments, and
   3. make lane adjustment gradually.

C. Generally, the longer a driver waits to respond to a problem, the more fuel will be spent handling it.

D. The driver must be able to pick the traffic picture apart to drive fuel efficiently.

E. Successful, fuel-efficient driving in traffic depends upon effective time/space management.
   1. Select the path with the smoothest traffic flow, thus permitting operation at an efficient speed.
   2. Zigzagging down the road with unnecessary lane changes usually requires extra acceleration.
   3. Having space to move into smoothly is fuel efficient. (Steer around rather than brake for an object.)
   4. If you maintain a good following distance, you can move ahead at a slow steady pace when those ahead are stopping and starting.
   5. A good following distance is fuel saving because it means many of the speed adjustments you make will be minor; you will brake less often, have better visibility, and can better anticipate traffic conditions ahead of the vehicle which is ahead of you.

F. Even when you stop the engine you can save fuel.
   1. Racing the engine before shutoff wastes fuel and does not "prime" it for the restart.
   2. Turn off all power-consuming accessories so that you minimize engine load at the next start up.

G. When drivers decide to adopt fuel-efficient driving techniques they usually alter many driving habits, a process that does not come easily and takes time. Each person must decide if it is worthwhile. It may be helpful to review what will be gained and what will be lost in the course of becoming a fuel-efficient driver.

H. The most obvious gain is driving more miles for each gallon of fuel purchased. This results in lower waste.

I. The most ideal situation for fuel-efficient driving is driving with a warm engine in a straight line at cruising speed, with minimal slowing and accelerating and with as little weight, wind resistance, and friction as possible. Unfortunately, one rarely drives under a perfect combination of these conditions. Therefore, one needs to know when and how to apply fuel efficient driving techniques in those driving situations most likely to save or waste fuel.

J. Fuel economy starts with seat adjustment and a turn of the ignition key. Whether you drive a gasoline or diesel vehicle, and whether you are starting in warm weather or cold, there are fuel-saving techniques for starting, idling and getting underway. (See owner's manual for diesel starting procedures.)

K. Avoid pumping the accelerator when starting.
   1. Try starting without pumping. If engine does not start, then pump accelerator pedal once before cranking again.
   2. Every pump of the accelerator means extra fuel is going into the engine.
   3. An engine that will not start quickly does not need pumping; it needs servicing.

L. Avoid racing the engine after starting.
   1. Revving a cold engine can easily cause damage and wastes fuel.
   2. An engine will warm just as fast at an idle as it will with revving.

M. Warm up the engine as you drive. Reduce idling time.
   1. After starting a cold engine, let it idle for no more than 30 seconds.
   2. Idling burns fuel and gets zero miles per gallon.
   3. A slow-moving vehicle warms the engine faster than idling it.
   4. It takes up to 20 minutes for an engine to reach peak efficiency under normal weather conditions (i.e., when all moving parts are warm). This point may never be reached in extremely cold climates.
   5. Idling doesn't warm your vehicle; it doesn't warm tires, transmission or differential, all of which cause lower mpg when cold.

N. Increase your speed when the engine is warm.
   1. Driving a cold vehicle is not harmful if you drive slowly (25-35 mph) for the first mile or two.
   2. You can tell when the vehicle reaches its normal operating temperatures by monitoring the gauges and using your own sense of feel for the engine's performance.
   3. When the vehicle reaches normal temperature you can get up to regular operating speeds.

O. The most fuel-efficient way to accelerate is with a steady, even pressure. This way you minimize your acceleration time.
   1. Accelerating too slowly or too rapidly wastes fuel. Accelerating requires as much as three times the amount of fuel needed to maintain cruising speed.
   2. The fuel-efficient driver accelerates smoothly and slowly.

P. Try to reduce the amount of time spent in lower, less fuel efficient gears.
   1. Higher gears are more fuel efficient.
   2. Lower gears are for power.
   3. In a manual transmission car, run through lower gears gently and quickly for minimum fuel consumption. (A vacuum sensor can assist the driver in identifying the most efficient shift points, which will vary depending on engine and vehicle size, load and terrain.)
   4. In an automatic transmission car, apply enough gas pedal pressure to ease the transmission into high range as quickly as possible. Ease up somewhat on the pedal to make the shift earlier.

Q. Hills and curves can be fuel-wasters.
   1. Accelerating before you begin to climb a hill will give better speed for less fuel than if you accelerate against the resistance of the grade.
   2. Ease off the throttle slightly when your climbing rate is comfortable.
   3. Maintain your momentum with a light foot on the accelerator.
   4. Near the top of a hill, ease off the accelerator and allow the car's momentum to carry it over.
   5. Let gravity help you on the downhill side.
   6. On steep downgrades, shift to a lower gear to control speed and minimize braking.
   7. Slow down going into curves and accelerate slightly coming out of curves.

R. Every time a vehicle is braked or slowed, momentum the engine worked to gain is lost.
   1. Anticipate traffic delays well in advance by observing conditions at least 12 seconds ahead of your vehicle.
   2. With good timing, you can avoid many unnecessary stops, starts, and slowdowns.
   3. Judging the movements of traffic and looking at least 12 seconds ahead allows you to make only minor speed adjustments and better selection of lane and lane position.
   4. Make required stops smoothly and gradually.
   5. Fuel-efficient driving techniques contribute significantly to safe driving.
   6. It requires awareness of the movements of all nearby roadway users—motor vehicles, pedestrians, cyclist, etc.—and close attention to the driving task.
   7. Consistent, economical driving will reduce vehicle wear and tear, extend the life of the vehicle, lower expenditure on repairs, and reduce tire and brake wear.

2.7 At highway speeds, the faster a vehicle is driven, the lower the mileage it will get from a gallon of fuel.

A. There are two reasons for the high speed fuel penalty.
   1. Wind resistance—It takes a great deal more horsepower to push a vehicle through the air at higher speeds. Using more horsepower means using more fuel. Wind resistance increases dramatically with speed. (Doubling the speed increases the drag factor four times and requires eight times the power.)
   2. Engine speed—When the top end of road speed range is reached, engine speed is in the high rpm (revolutions per minute) range where there is less torque for each gallon of fuel burned. The faster the engine runs, the lower the mpg.

B. All vehicles have a road speed or cruising range in which they get their best fuel economy, usually 30-40 mph.
   1. Faster or slower than that range and fuel economy suffers.

C. Even when a vehicle is driven without its fuel-efficient road speed range, it will not get good mileage unless it is also being driven in the fuel-efficient drive gear range.
   1. You must match your gear selection to your road speed.
   2. Select the gear where rpm is as low as practical. (A vacuum sensor is the simplest way to determine the best gear.)

D. Operating at a steady cruising speed is important for fuel economy, reduces maintenance needs, and increases safety.
   1. To achieve a steady speed select a safe road speed in the fuel-efficient range and then try to hold it.
   2. Make as few speed adjustments as possible.
   3. If you must adjust your speed, plan ahead so your adjustments are minor and gradual.

E. Maintaining a steady speed is better than changing speeds because even minor accelerations waste fuel.

F. Good speed management practices have significant safety benefits. Although many things contribute to the occurrence of accidents (e.g., weather, highway conditions, vehicle condition, volume of traffic, driver), two factors related to speed generally hold true.

1. The risk of having a crash increases as the vehicle's speed varies from the average traveling speed on the highway.
2. Given the occurrence of an accident, the risk of an injury or a fatality increases as vehicle speed increases.
3. Highway deaths dropped more than 16 percent in nearly half of the 50 states during the first year of the 55 mph national maximum speed limit (1974) and went down more than 20 percent in 15 states. It is generally agreed that about half of this decline can be attributed directly to reduced speeds.
4. Following the introduction of the 55 mph national maximum speed limit, the chance of an accident on a turnpike decreased by about one-sixth and the chance of death from an accident decreased by one-third.
5. This improvement in traffic safety followed too closely upon energy-related changes in driving speeds and travel patterns to be considered a coincidence.
6. The lower speed limit is now regarded as perhaps the single most significant action taken on behalf of highway safety in half a century.
7. By reducing speed, it lessens the chance of death or serious injury. (The chances are only 50-50 of living through an accident when traveling 70 mph or faster, the odds are 7 to 1 more at 60 to 70 mph, and 31 to 1 more when traveling at 50 to 60 mph.)
8. By causing traffic to flow more uniformly, the lower speed limit reduced conflicts and resulting traffic accidents. (This is because the slower limit tends to cluster more vehicles around the same speed, rather than some going 50 mph while others travel 70 mph, a situation that created passing hazards and additional conflicting traffic situations.)

G. Tests conducted by the Federal Highway Administration (FHWA) indicate that motorists can get 17 to 40 percent better mileage by driving 55 mph than 70 mph.

1. The exact savings vary with the type of vehicle and its engine design. Transmission, aerodynamics, horsepower, weight, optional equipment, and anti-pollution devices are also factors.
2. A compact car, for instance, traveling at 70 mph will average 15.4 mpg; but at 55 mph the mileage will increase to 18.2 mpg.
3. In a standard sized car the same cutback in speed, from 70 to 55 mph, would increase mileage from 14.9 to 16.8 mpg.
4. Since its enactment, the national 55 mph speed limit has had a substantial effect on driving habits and traffic safety. Still, many motorists and public officials remain skeptical. They question whether the law is really worthwhile and necessary. The answer is an emphatic "yes." It has produced tangible benefits in lives saved as well as fuel benefits.
5. If every vehicle on our highways were driven within the 55 mph national speed limit, we could save up to 3 billion gallons of fuel per year, enough to keep all the automobiles in Indiana and Arizona running for a full year.
6. As a direct result of lower speeds, deaths and serious injuries can continue to be cut sharply, and many future lives can be saved.

Pre/Post Assessment

Energy Conservation

1. The mpg sticker on a new car means that car has reached that figure in actual tests.
   _____True _____False

2. Our driving habits may be the single most important element in improving fuel economy.
   _____True _____False

3. Pumping the accelerator when starting can actually save fuel.
   _____True _____False

4. The smaller the frontal area of the car, the better the fuel economy.
   _____True _____False

5. A small-sized car pulling a trailer will probably get better mileage than a mid-sized car pulling the same trailer.
   _____True _____False

6. An empty luggage rack does not have an influence on mileage.
   _____True _____False

7. Excessive use of brakes will lower mileage.
   _____True _____False

8. What percent of energy goes through the exhaust pipe as heat?
   _____A. 1/5
   _____B. 1/4
   _____C. 1/3
   _____D. 1/2

9. The average amount of fuel used each day by passenger vehicles (in gallons) is
   _____A. 1/2
   _____B. 1
   _____C. 1½
   _____D. 2

10. Which of the following would contribute to good fuel economy?
    _____A. Power accessories
    _____B. Air conditioning
    _____C. A low rear axle ratio
    _____D. Automatic transmission

11. In order to save fuel when going up a hill, you should
_____A. accelerate before you get to the hill.
_____B. wait until the vehicle starts to slow down before accelerating.
_____C. accelerate just as you start up the hill.
_____D. accelerate at about mid-point on the hill.

12. How long does it take the normal engine to reach peak efficiency?
_____A. 3 minutes
_____B. 5 minutes
_____C. 15 minutes
_____D. 20 minutes

13. Which of the following will increase your fuel economy?
_____A. Let your car warm up for 2 minutes before driving.
_____B. Drive a cold vehicle slowly for the first few miles.
_____C. Revving a cold engine to get warmed up.
_____D. Allowing the engine to idle as much as possible.

14. At which speed can you get the best mileage?
_____A. 55 mph
_____B. 60 mph
_____C. 65 mph
_____D. 75 mph

15. For every 100 pounds of additional weight, fuel economy can be reduced by what amount?
_____A. 1/4 mpg
_____B. 1/2 mpg
_____C. 3/4 mpg
_____D. 1 mpg

Pre/Post Assessment Answers

Energy Conservation

1. False
2. True
3. False
4. True
5. False
6. False
7. True
8. C
9. D
10. C
11. A
12. D
13. B
14. A
15. D

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Unit C:
Contemporary Driving

Unit C:
Contemporary Driving

Concepts

1.0	Trip Planning and Driving Inventory
2.0	The Changing Vehicle Mix
3.0	Driving Small Cars Safely

Content

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit C: Contemporary Driving

1.0 Trip Planning and Driving Inventory

Principle: Whether the trip is long or short, the operator selects a route, decides when to travel, and considers special equipment for the particular mission. During the approach and entry to the vehicle, the driver must be sure that the vehicle, self, passengers and the load are indeed ready for departure. Any neglect in this final pre-driving stage can result in subsequent inconvenience, frustrations and unsafe conditions. This concept emphasizes principles and practices related to trip planning and the pre-driving inventory that reduce the demands on the operator once the trip is underway.

1.1 Alternatives to Driving

Objectives/ Student Behavior: Given alternative means of travel (air, rail, bus, private car) and information surrounding the situation, identify the advantages and disadvantages of each. Students will identify various reasons why a trip may be necessary and how preparations will differ.

Learning Activities: Have a group discussion based on the advantages and disadvantages of various types of vehicles used on trips.

1.2 Route Selection

Objectives/ Student Behavior: When given origin and destination points for a long-distance trip, identify the best route, locations of critical decisions relating to route changes, desired times to travel, planned stops, cost and other factors.

Learning Activities: Bring maps to distribute to the class; then help them plan a trip and calculate the cost per mile.

1.3 Equipment

Objectives/ Student Behavior: Given the conditions (origin and destination, time of year, people involved and other relevant information), prescribe the standard and special equipment which should be taken.

Learning Activities: Identify the parts of the vehicle to be checked and the required safety equipment for the vehicle.

1.4 Pre-driving Inventory

Objectives/ Student Behavior: Following a correct sequence of steps, enter, prepare the vehicle, self and passengers for driving without error.

Learning Activities: Discuss what should be done before departing on a trip.

1.5 Economic Factors

Objectives/ Student Behavior: Students will be able to describe ways to lower the cost of long and short trips.

Learning Activities: Have students map out their family's trips for one week. Then devise a plan that will save them money.

Content

1.0 Trip planning, a crucial aspect of the driving task, can determine whether equilibrium is maintained in the people-machine-environment interaction.

1.1 Is the trip necessary and, if so, do you need to drive?

A. Sometimes people use their vehicles for other than transportation need, which may or may not be appropriate.

B. Through car pools (joining others going to the same destination) we can reduce the:
1. number of vehicles needing roadway and parking space;
2. opportunities for accidents—fewer vehicles with fewer possible conflicts; and
3. cost.

C. Public transportation, under certain conditions, has advantages:
1. less expensive than driving a private vehicle if only one person is traveling;
2. when relieved of the driving task you can relax, read, work, or enjoy the scenery; and
3. air travel, particularly on long trips, reduces travel time considerably, allowing more time at your destination.

1.2 By clearly identifying the destination point of a trip and the best route to get there, drivers can avoid many frustrations and distractions enroute.

A. With slight deviations from a crow's flight route, a driver can often reduce the time, irritations and a number of hazards.

B. Without sufficient preparation and proper navigation the driver may get lost or be on routes that present unexpected difficulties. (Furthermore, the driver may drive faster to make up time.)

C. A "lost" driver searching for a street name, house number, and other route information is a hazard to everyone. (Passengers can assist the driver in this matter.)

D. In preparing for a trip the route(s) may be memorized or written down by studying maps so that hazardous slowing to seek or study direction signs will rarely be necessary.
1. At considerable expense and effort, automobile clubs, insurance companies, oil companies, highway departments, chambers of commerce and other organizations provide free maps to help travelers in trip planning. Some will plan your trip and mark the best routes.
2. Since changes are occurring daily in our highway network system, the traveler should use the most up-to-date map obtainable.
3. If a person is to interpret a map accurately, being familiar with the symbols and markings (legend) printed on the map is necessary.

E. Some of the factors to consider in selecting the safest, most convenient and economic route are the:
1. length;
2. kind of trafficway—number of lanes, controlled, limited or free access, etc.;
3. volume of traffic;
4. toll roads or bridges;
5. potential trouble spots, such as railroad crossings, congested access, unsignalized intersections with major highways, notoriously high accident locations, and difficult left turn situations;
6. eating, sleeping and refueling places;
7. scenery and places of interest; and
8. the nature of the vehicle (two-wheeled vehicles and trucks are unsuitable or illegal on certain routes).

F. By watching for confirming route signs, particularly after turns and on detours, the driver lessens the possibility of driving far out of the way at any time.

G. A key to trip planning is the selection of time when you travel, an element that you can control to some extent.
   1. The starting and arrival time for a trip should allow for a "time cushion" in consideration of service and rest stops, possible bad weather, traffic congestion and other unexpected delays (flexible planning).
   2. Drivers in a hurry due to a late start (when you start a trip 10 minutes late, expect to arrive 10 minutes late), or attempting to travel too far in a limited time, tend toward chance-taking, excessive speed and impatience.
   3. Over-long trips (driving many hundreds and even a thousand miles without bed rest) is a common dangerous practice (300 to 500 miles is a full day's drive). Too often a quick roadside rest gives the long-distance driver a false sense of readiness.
   4. You may not be able to control the tension-causing factors in your environment, but you can remove the added pressure of a deadline.
   5. A relatively small amount of time is gained by driving 65 mph compared to 55 mph.

H. If you start and stop early in the day on long trips, you will encounter less traffic, make it easier to find suitable lodging, and avoid night driving when navigation is much more difficult.

I. Trip time and frustration can be reduced by avoiding cities, tunnels, bridges and other known bottlenecks at peak periods of traffic. (Some cities place special traffic rules in effect during these periods.)

1.3 & 1.4 Special and standard equipment and preparation can help a driver and the passengers to cope with possible unusual or adverse environmental and seasonal conditions, vehicle breakdown, illness or accident, amusement of small children, and financial matters. Knowing what to expect and preparing for the worst is just as important as knowing what road to travel.

A. Properly functioning defroster equipment, along with disposable paper towels and a scraper, are an asset in keeping the vehicle windows clear (inside and out), particularly when no service station is near.

B. In time, the rubber in windshield wiper blades deteriorate and the pressure of the blades against the windshield may change; therefore, a periodic check of this safety device is important.

C. Bad weather equipment which may be needed, depending on the locality and the season, includes a small shovel, reinforced tire chains, a bag, box, or bucket of sand or ashes, a blanket, burlap bags, or section of carpet, and a tow rope or cable. (Winter comes early and stays late in high mountain passes.)

D. High altitude affects drivers and vehicles. "Thin air" (low oxygen content) causes quick fatigue and impairs vision, judgment and decision-making. Furthermore, engine horsepower declines as altitude gets higher.

E. Being able to control within-vehicle extremes, either in humidity or heat, can reduce driver and passenger discomfort, irritation and fatigue. Air conditioning also reduces noise level, another safety factor.

F. A spare tire, properly inflated, plus a jack and other tire-changing tools are essential items.

G. A few basic tools (screwdriver, wrench, hammer) may be all that is needed on occasion to correct a minor vehicle defect.

H. Carrying a first aid kit in the vehicle when traveling can reduce discomfort and suffering in the event of illness or an accident.

I. Special consideration needs to be given to entertaining small children riding in the vehicle so they do not distract the operator from guidance and control tasks. Someone other than the driver should supervise the children.

J. When one proposes to pull a trailer, certain legal and safety considerations are essential (brakes, lights, hitch, springs, etc.).

K. A flashlight and flares are particularly helpful in the event that your vehicle becomes disabled at night. The flashlight should be visible from at least 1,000 feet.

L. Jumper cables, although not a necessity, could prove to be quite valuable in an emergency created by a dead battery, especially for an automatic transmission car.

M. A fire extinguisher is rarely needed, if ever, but the need is crucial if it does arise.
   1. Hundreds of thousands of automobile fires are reported annually.
   2. Approximately half of the fires break out under the hood, the result of short circuits in the wiring.
   3. The best means for handling a fire is a fire extinguisher, but unfortunately few drivers carry one.
   4. In lieu of a fire extinguisher use a blanket, a top coat, dirt, sand, snow or anything that you can find quickly to smother the fire.
   5. If the fire is small and water is nearby, use a hub cap as a container to douse water on the fire.
   6. If the fire gets out of control, move well away from the car, as the gas tank may explode.

N. If you use travelers' checks and credit cards, you can avoid carrying large sums of cash.

1.5 Proper planning can save a substantial amount of fuel on long and even short trips.

A. Long trip planning should be done with economy as well as other factors in mind.
   1. A longer route at steady, fuel-efficient speeds is far better than one with numerous stoplights and traffic tie-ups.
   2. Plan alternate route for bad weather conditions.
   3. Use road and street maps to organize trips; identify the best road surfaces and choose your lanes; identify one-way streets, no-left turn intersections, and exits.
   4. Expressway driving is nearly twice as economical as driving in heavy city traffic.
   5. Choose road surfaces which offer less resistance to tires. It costs more to travel on muddy, loose gravel, or snow-covered roads.
   6. Memorize route changes and exits so that you do not drive extra miles to correct a mistake.
   7. Pick parking locations that have easy access.
   8. Plan driving during the part of the day when the air conditioner will not be used.

B. Short trip planning over an extended period of time can save a great deal of fuel.
   1. Try to take advantage of "ridesharing" and the numerous fuel efficient alternatives to driving your own vehicle.
   2. A vehicle which gets 20 mpg with a load of four people is getting 80 people miles per gallon.
   3. Plan trips to the store in combination with other activities.
   4. Plan out the shortest route to and from where you need to go.
   5. Take turns with other parents picking up children from school, athletics, etc.
   6. Pre-plan household and daily needs so some trips could be eliminated.
   7. Identify essential trips and then select those that can be easily combined.
   8. Eliminate unnecessary trips. Some things can be done just as quickly and efficiently by telephone or mail.
   9. Cluster your essential trips by time, location and route.
   10. For short or long trips, figure out which routes will require the least fuel.
   11. Pick routes where a steady speed can be maintained without interruption.
   12. Try to avoid heavy traffic, congestion, and excessive stop and go situations.
   13. Even if it means extending your route slightly, route your trip so that it is a smooth and steady pace.

Pre/Post Assessment

Trip Planning and Driving Inventory

1. One of the elements of trip planning under the driver's control is time.
   _____True   _____False

2. Since the spare tire is seldom used, there is no need to check it before going on a trip.
   _____True   _____False

3. The difference in time saved when driving 65 mph as compared to 55 mph is a relatively small amount.
   _____True   _____False

4. As drivers, all of us could do considerably more to conserve energy.
   _____True   _____False

5. Before you can interpret a map accurately, you must be familiar with the printed symbols and markings (legend).
   _____True   _____False

6. Public transportation has more advantages than most of us realize.
   _____True   _____False

7. Which of the following is necessary equipment to take along on a trip?
   _____A. Spare tire
   _____B. Fire extinguisher
   _____C. Jumper cables
   _____D. All of the above could be important

8. Things you especially should have in your vehicle in Montana during the winter are:
   _____A. dry sand.
   _____B. a shovel.
   _____C. fire starting material.
   _____D. gloves.
   _____E. all of the above.

9. The advantages of pre-trip planning when going on a trip:
   _____A. You can avoid all the construction projects.
   _____B. You can avoid bad weather.
   _____C. You can have better accommodations.
   _____D. You can choose the most economical route.

10. A "full day's drive" with the necessary stops would be about how many miles?
    _____A. 300-500 miles
    _____B. 600-700 miles
    _____C. 750-900 miles
    _____D. 950-1000 miles

Pre/Post Assessment Answers

Trip Planning and Driving Inventory

1. True
2. False
3. True
4. True
5. True
6. True
7. D
8. E
9. D
10. A

Appropriate Instructional Materials

Bumpa-Tel Filmstrips

Maps for reading and trip planning

Textbook References:

Trip Planning and Driving Inventory

Drive Right.
pp. 316-321 (1982)
pp. 330-337 (1977)

Driver Education and Traffic Safety.
pp. 76-77

Driving: A Task Analysis Approach.
pp. 211, 214-216, 219-225

Driving with Car Control.
pp. 243-256

In the Driver's Seat.
pp. 227-231, 251-256, 295-310

Safe Performance Driving.
pp. 12, 62-63, 359, 369-384

Tomorrow's Drivers.
pp. 124-131, 155-156, 183-189

Unit C: Contemporary Driving

2.0 The Changing Vehicle Mix

Principle: The rate of change in the nation's highway transportation system over the next decade will be substantially different from that which we have experienced during any like period in the past. Automobiles are getting smaller, lower and lighter while trucks are getting longer, higher and heavier. Motorcycle, bicycle, moped and pedestrian travel are all increasing. This concept introduces students to the key aspects of our changing vehicle fleet as a reminder that the traffic environment of the future will continue to change. All highway users will be exposed to new travel patterns and hazards. The content emphasizes the dominance of the small car in the changing traffic mix. Finally, students will be helped to acquire information needed to make intelligent decisions regarding their roles as drivers, riders and pedestrians. See Concept 3.0, Unit D, of Section 1.

2.1 Vehicle Mix

Objectives/ Student Behavior: Predict the effect that the changing size and distribution of vehicles will have on highway use and safety.

2.2 Other Travel Modes

Objectives/ Student Behavior: Explain why people are resorting to less costly forms of transportation.

2.3 Small Car Dominance

Objectives/ Student Behavior: Explain why small cars may eventually be the dominant vehicles on the road.

2.4 Vehicle Changes

Objectives/ Student Behavior: Identify changes in the characteristics of vehicles that are expected to continue.

2.5 Small Car Classification

Objectives/ Student Behavior: Classify passenger automobiles by size and weight.

Content

2.0 The highway traffic vehicle mix is changing dramatically. This has been brought into sharp focus by changes in our vehicle fleet and travel patterns related to fuel conservation.

2.1 The distribution of vehicles by size class, often referred to as vehicle mix, has undergone substantial change since the mid 1950's when small foreign cars began to impact the U.S. market.

A. Since the oil crisis of 1973-74, the trend has been toward more fuel efficient use and design of motor vehicles.

B. While cars are getting smaller, lighter, and closer to the ground, trucks are getting bigger, longer, heavier and higher off the ground.
   1. One car manufacturer estimates that the average weight of its 1985 models will be approximately 1,000 pounds less than its 1975 models.
   2. The spread in vehicle weights has broadened so that we now have autos weighing less than 2,000 pounds mixing with cars weighing over 4,000 pounds.

C. The number of trucks and buses has grown at a more rapid rate than the number of passenger cars.
   1. In 1963, trucks made up less than 16 percent of the total fleet. By 1978, this percentage had increased to just over 20 percent.
   2. It is reasonable to expect that by 1990, fully 25 percent of our vehicle fleet will consist of vehicles on the large end of the size spectrum—trucks and buses.

D. Coupled with the increase in smaller cars, the increased number of heavier vehicles will compound the long-standing mismatch which has existed with trucks, buses, and automobiles sharing a common roadway.

2.2 Highway users are resorting to less costly forms of transportation (i.e., motorcycles, mopeds, bicycles, and walking).

A. The increase in use of motorcycles, mopeds, and bicycles is growing at a faster rate than the population.
   1. Bicycles, once used almost exclusively by children and teenagers, are now being used more by adults in urban settings as a basic means of transportation.
   2. The number of registered motorcycles will nearly double between 1975 and 1990 (the motorcycle fatality rate is about five times that for all vehicles).
   3. Observers envision a full integration of mopeds into the American transportation scene by the mid 1980's, when as many as five million mopeds are expected to be in use.

B. People are rediscovering the physical and economic benefits of walking. Even with the increased numbers of highway users on foot, including joggers, their contributions to traffic mix problems usually go unnoticed.

2.3 The small car will eventually be the dominant class of vehicle on the road.

A. By 1985, the majority of cars on the road will be in the small class (compacts and sub-compacts compared to intermediates and full-size automobiles).

B. The relative stability of sales in the luxury-specialty class (about 5 percent) and the consistent preference shown for intermediate (around 20 percent) as a compromise between large and small cars supports this thinking.

C. If present trends continue, the Department of Transportation has projected that by 1990, 60 to 65 percent of the cars on the road will fall into three categories—compact, sub-compact, and mini-compact. By 1995, projections indicate 85 percent of the cars will be these sizes.

2.4 Changes in the characteristics of vehicles to improve fuel economy are expected to continue through the 1980's.

A. Vehicles will weigh less, and there will be more small vehicles in the fleet. Technology of engines, transmissions, tires, and aerodynamics will be at a much more advanced level.

B. With few exceptions, the automobiles of the 1980's will be downsized, have front wheel drive, and be built with lighter materials.
   1. Downsizing means that an automobile's external dimensions are reduced without changing the interior volume. All domestic manufacturers have downsized their full-size, mid-size, and compact cars. Significant downsizing is not applicable to sub-compact automobiles.
   2. Front wheel drive (FWD) means that aluminum, plastic, and high strength, low alloy (HSLA) steel are substituted for carbon steel, the main component of traditional automobiles and light trucks.

C. These vehicle changes reduce the average inertia (at rest) weight of automobiles from about 4,100 pounds in the 1975 model year to about 3,300 pounds in the 1980 model year, and about 2,900 pounds in the 1985 model year. (Inertia weight is the curb weight of the vehicle plus 300 pounds, or the equivalent of two 150-pound adults.)

2.5 Automobiles can be defined in a variety of ways. Some agencies place automobiles in size categories by measuring their interior space. Others use weight to classify them because currently their relative safety is dependent on weight. In general:

A. Sub-compacts have a wheel base of less than 100 inches and a curb weight of under 2,300 pounds.

B. Compact cars have a wheel base between 100 and 106 inches and a curb weight between 2,300 and 2,799 pounds;

C. Mid-size (or intermediate) cars have a wheel base of between 106 and 114 inches with a curb weight of between 2,800 and 3,399 pounds; and

D. Large cars have a wheel base of 114 or more inches and a curb weight of more than 3,400 pounds.

Pre/Post Assessment

The Changing Vehicle Mix

1. A downsized automobile has both external dimensions and interior volume changes.
   _____True   _____False

2. What is the main hazard an automobile operator has with motorcycles?
   _____A. A motorcycle has too much power.
   _____B. A motorcylce can't be seen.
   _____C. The motorcycle makes too much noise.

3. Select the true statements.
   _____A. Trailers and motorcycles are allowed on all roads and highways.
   _____B. Passengers riding in a camper are as safe as those riding in a truck cab.
   _____C. The registration slip or card for motorized vehicles must be with the vehicles.
   _____D. Road maps are useful to determine distance, directions and locations, but not much else.

4. Protective clothing or equipment for motorcyclists is
   _____A. required in all states.
   _____B. required in some states.
   _____C. not required.

5. Trucks make up a great part of our road traffic. Therefore, other drivers should keep in mind that trucks.
   _____A. are slow in accelerating.
   _____B. require a greater stopping distance.
   _____C. require more driving space.
   _____D. all of the above.

6. Driving a large truck is
   _____A. the same as driving a car.
   _____B. easier than driving a car.
   _____C. more complicated than driving a car.

7. A person's driving is affected by the other driver's
   _____A. attitude.
   _____B. alertness.
   _____C. physical conditions.
   _____D. all of these.

8. Which of the following is the most important item worn while riding a motorcycle?
   _____A. Leather boots
   _____B. Helmet
   _____C. Long gloves
   _____D. Heavy pants

Pre/Post Assessment Answers

The Changing Vehicle Mix

1. False
2. B
3. C & D
4. B
5. D
6. C
7. D
8. B

Appropriate Instructional Materials

The Changing Vehicle Mix

Filmstrip:
"Cars and Other Vehicles," 78 frames, 15 min., Bumpa-Tel.

"Consumers' Guide to Automotive Safety Features," Chrysler Corp., P.O. Box 1919, Detroit, MI 48231 (free).

Textbook References

Drive Right.
pp. 339 (1977)
pp. 70-71, 75-77, 300-301, 309 (1982)

Driver Education and Traffic Safety.
pp. 10, 118-126, 305-306

Driving with Car Control.
pp. 6-10, 65-67, 76, 100-110, 124, 281-283, 291

Unit C: Contemporary Driving

3.0 Driving Small Vehicles Safely

Principle: As cars and pickup trucks become smaller, the challenge to improve their safe operation becomes more critical. This concept is designed to meet that challenge. To reduce the chance of serious injury in small vehicles and to compensate for the differences between small and large cars and pickups, students must learn to use available restraint systems and practice time-space relationships.

3.1 Occupant Restraint Use

Objectives/ Student Behavior: Students will be able to explain why restraint systems are vital in the small cars.

3.2 Instrument Panel Familiarization

Objectives/ Student Behavior: Students will explain the importance of familiarization of a small car's instrument panel.

Learning Activities: Discuss the controls found on the steering column.

3.3 Acceleration

Objectives/ Student Behavior: Students will explain how acceleration is different in a small car.

3.4 Manual Shifting

Objectives/ Student Behavior: Students will describe the process of manual shifting.

Learning Activities: Discuss the various patterns of manual shift cars.

3.5 Steering Response Differences

Objectives/ Student Behavior:	Students will be able to explain how large and small cars differ in steering response.
Learning Activities:	Discuss the sensitivity of steering response in small cars.

3.6 Wind Factors

Objectives/ Student Behavior:	Students will be able to describe the effects of wind on a small car.
Learning Activities:	See Unit C of Section I.

3.7 Front Wheel Drive

Objectives/ Student Behavior:	Students will be able to describe the benefits of a front wheel drive car.
Learning Activities:	Compare and contrast the pros and cons of front wheel drive.

3.8 Following Distances

Objectives/ Student Behavior:	Students will be able to explain why following distance may need to be increased for small cars.
Learning Activities:	Discuss problems of seeing and being seen in small cars.

3.9 Hatchback Hazards

Objectives/ Student Behavior:	Students will be able to list the potential problems with hatchback cars.

Content

3.0 There are a number of actions that small vehicle drivers and occupants can take to reduce the hazards of small vehicle travel.

3.1 The most Immediate way for occupants of small vehicles to increase their chances for surviving a serious crash is to use the safety belts which are already in their vehicles.

A. Occupants of small vehicles who do not wear safety belts increase the risk of death or injury by a factor of five compared to a person using belts In a large car.

B. With a greater mlx of large and small cars on the road, motorists who switch to small cars need additional crash protection to offset their increased risks. That is why the insurance industry, medical, and consumer groups strongly support federal safety standards requiring that cars be equipped with either automatic belts or air cushion systems.

3.2 Before taking the road, drivers of small vehicles must become familiar with the instrument panel display and the operation of various vehicle controls.

A. The location and operation of some controls wlll likely be different than that of many large cars.

B. Several controls that are on the dashboard of older vehicles are now found in small vehicles on a steering column attachment.

C. Small vehicle foot pedals are small and close together.

3.3 Acceleration in some small vehicles is surprisingly fast.

A. In some small vehicles manual shift transmissions may provide greater initial acceleration.

B. Small-vehicle maneuverability and acceleration response may cause some drivers to develop overconfidence and take greater risks by weaving in and out of traffic.
   1. The small vehicle driver may not be aware that drivers of large vehicles cannot see smaller vehicles as well.
   2. Small vehicle drivers must take into account a larger vehicle's inability to maneuver or stop as quickly.

3.4 Manual or stick shifting may create problems for the inexperienced driver.

A. For optimum mileage and performance, most small vehicles come with a choice of either a four or five speed transmission.

B. Stick shifting means learning to use the right gear at the right moment at the right speeds.

C. A special problem is moving a manual shift vehicle forward when stopped on a steep hill.
   1. This can be a major problem when other vehicles are behind the manual shift vehicle.
   2. The clutch-accelerator should not be used to hold the vehicle from rolling backward (mechanical problems could result).
   3. The parking brake should be used to prevent the vehicle from rolling back.
   4. To move forward, the parking brake and clutch are released as the accelerator is depressed.

3.5 Drivers may notice a difference in steering response when switching from a large to small vehicle.

A. A small vehicle is likely to have more responsive steering.
   1. Turning the steering wheel a given number of degrees turns a small vehicle further than it would a larger vehicle.
   2. If the driver is not accustomed to this quick steering response, there may be a tendency to overcorrect when trying to quickly steer around an obstacle or to stabilize the vehicle in a wind gust.

B. Steering differences are especially noticeable when towing a trailer with a small vehicle.
   1. A trailer may also tax braking capability.
   2. If loads must be towed by a small vehicle, manufacturer's towing instructions should always be followed.

3.6 Wind is a big factor in controlling a small vehicle, especially at high speeds.

A. Unexpected crosswinds or the rush of air caused by a passing trailer, truck or bus can blow a small, "boxy" vehicle into another lane.

B. The greater the speed, the greater the problem with wind buff or high winds.

C. Different vehicles have different handling characteristics in high winds.
   1. Rear-engine models are particularly liable to crosswinds.
   2. Headwinds can cause rear-engine models to pitch.
   3. Mid-engine cars, although better balanced, are easily buffeted by wind gusts.
   4. Front-engine vehicles, especially those with front-wheel drive, track best under windy conditions.

D. A small vehicle is more susceptible to aerodynamic interference when being passed at highway speeds by larger vehicles.

3.7 The basic driving skills needed for good vehicle control are the same for either front wheel or rear wheel drive vehicles.

A. Today both front and rear wheel drive vehicles are more responsive to steering inputs than those of a few years ago.
   1. Responsiveness is associated with weight reduction, wheel base, tire characteristics, suspension tuning, and steering gear ratio selection.

B. A skid is handled the same with both types of drive systems.
   1. A skid can result when you lose traction on two or more wheels.
   2. The best way to recover from a skid is to generate as much cornering traction as possible.
   3. Braking or accelerating reduces available cornering traction.
   4. For maximum cornering traction and steering control ease off the gas, do not touch the brake, and steer to keep the front end of the vehicle pointed in the direction you want the vehicle to travel.

C. A skid resulting from too much throttle on a slippery road may feel different in a front wheel drive than in a rear wheel drive vehicle.

D. The slipperiness of the road may be more difficult to judge in a front wheel drive vehicle for a driver who is used to the indications provided by a rear wheel drive vehicle.

E. The braking technique for a front wheel drive is the same as for a rear wheel drive.
   1. The goal is to squeeze braking without lockup.
   2. Braking to point just before lockup is the best method of braking and maintaining steering control.
   3. Locked-braking is not recommended unless there is no choice and directional control is not a factor.

3.8 A safe following distance is an important safety factor for all drivers.

A. The best method for maintaining a safe following distance between vehicles is to use the time-distance relationships.
   1. Under normal traffic conditions a following distance of two seconds is the minimum necessary for a driver to see around the car ahead, to change lanes quickly if necessary, or to brake to a stop if the car ahead brakes suddenly.
   2. When following a vehicle that impairs visibility, such as a van or large truck, a driver should increase the following distance to three or four seconds.

B. Following distance can be determined by observing the rear of a lead vehicle as it passes a fixed object, such as a sign or tree.
   1. The driver starts counting "one thousand one, one thousand two," etc. If the front of the driver's vehicle reaches the fixed object before the count reaches "one thousand two," the driver is following too closely.
   2. Additional time intervals of 5 to 6 seconds should be applied under hazardous weather or road condtions.

C. By controlling following distances, a driver can make needed adjustments as traffic situations develop, both in front of and behind the vehicle.
   1. Prior to braking, small vehicle drivers should glance in the rearview mirror to check the closing rate of following vehicles.
   2. Should a vehicle to the rear appear to be closing rapidly, a driver practicing time/space control should have enough space to increase speed or change lanes.

3.9 Children should not ride in the luggage area of a hatchback (or station wagon).

A. The back window or hatch should always be kept closed when children are riding in the back seat to prevent accidental ejection.

B. Open hatchbacks or tailgate windows increase the levels of carbon monoxide inside the vehicle due to exhaust fumes.

Pre/Post Assessment

Driving Small Vehicles Safely

1. A front wheel drive vehicle will usually track better under windy conditions.
   _____True _____False

2. The greater the speed, the greater the wind buff on the vehicle.
   _____True _____False

3. Small foot pedals that are close together can create problems for the driver not acquainted with small vehicles.
   _____True _____False

4. Skid control is different for front wheel drive vehicles.
   _____True _____False

5. The braking technique for a rear wheel drive vehicle is different than for a front wheel drive vehicle.
   _____True _____False

6. Small vehicles are not as easily seen as larger vehicles.
   _____True _____False

7. Which of the following vehicles are considered the safest?
   _____A. Large vehicles because they have more protection.
   _____B. Sub-compact vehicles because they are more maneuverable.
   _____C. Mid-sized vehicles because they have extra strength of structure built into the body.
   _____D. Motorbikes because of their open vision and maneuverability.

8. Which of the following is true concerning following distances when there is a variety of vehicles?
   _____A. Following distance will always follow the 2 second rule.
   _____B. Following distance should be increased when visibility is obstructed.
   _____C. Following distance is less than the 2 second rule when most of the traffic is composed of smaller vehicles.
   _____D. None of the above apply.

9. Concerning the controls of some smaller vehicles:
   _____A. There are not as many of them.
   _____B. They are usually easier to operate.
   _____C. They are usually located differently than on large vehicles.
   _____D. They are more sensitive than on larger vehicles.

10. Which of the following might the driver of a large vehicle notice as a major difference when driving a small vehicle?
    _____A. The influence of wind on the vehicle.
    _____B. Shifting.
    _____C. Acceleration.

Pre/Post Assessment Answers

Driving Small Vehicles Safely

1. True
2. True
3. True
4. False
5. False
6. True
7. A
8. B
9. C
10. A

Textbook References

Driving Small Vehicles Safely

Drive Right.
pp. 228, 339 (1977)
pp. 200, 214, 300-301, 309, 323 (1982)

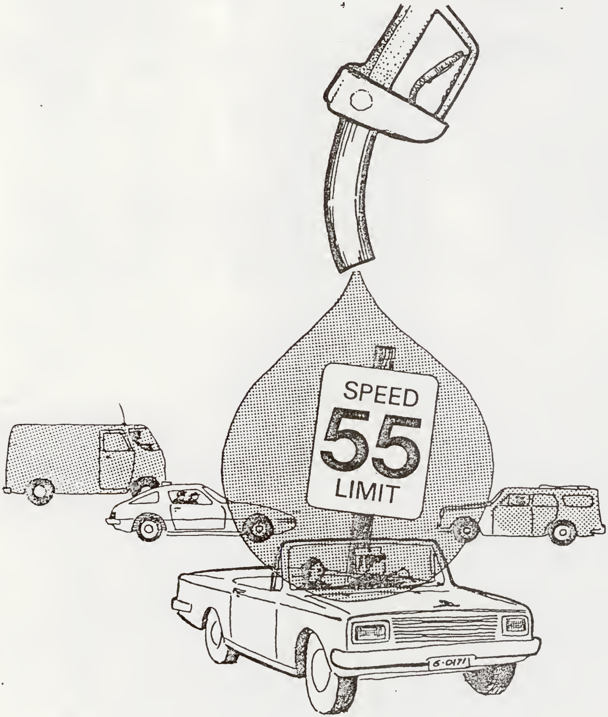
Driver Education and Traffic Safety.
pp. 242-254

Driving with Car Control.
pp. 105-109

Safe Performance Driving.
pp. 204-207

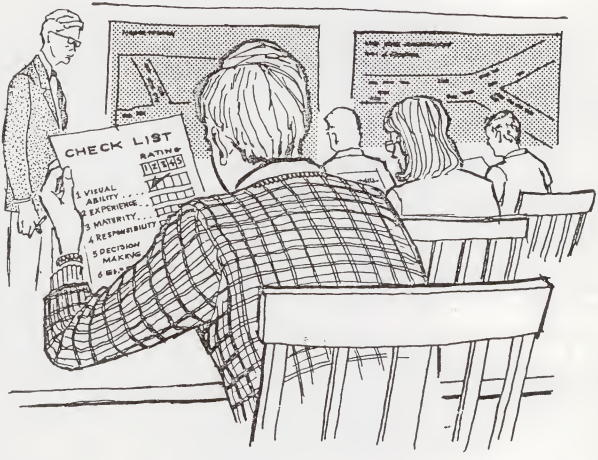
Section III:

Improvement Tasks



Unit A:

Self-Improvement



Unit A:
Self-Improvement

Concepts:

1.0	Risk Acceptance
2.0	Self-Analysis and Improvement

Content

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit A: Self-Improvement

1.0 Risk Acceptance

Principle: Operator competence is marked by wise and responsible decision-making. Underlying this concept is the assumption that students who understand their personal decision-making process, particularly with regard to risk, will build up internal standards of behavior. Moreover, these self-imposed standards will be more effective than adult-imposed standards. In this and the following concept, method becomes all important. The purpose is not to convey information, but rather to help students "discover" why they behave as they do (motivation). Students will draw on their personal experiences through a series of searching questions posed by the teacher. The purpose of the questioning process is to stimulate students to formulate their own generalizations, basic to the development of internal standards for responsible behavior. No doubt the discussions will produce some different and more meaningful generalizations than are presented here. Those which follow only suggest some directions for the discussions.

1.1 Risk Assessment

Objectives/ Student Behavior: Identify and appraise the factors that motor vehicle operators (particularly youth) consider when assessing risks on the highway.

Learning Activities: What are some major kinds of risks that vehicle operators take? During the last week, what are some of the risks that you saw other people—parents or friends—take while driving? In each example, what did the operator stand to gain by taking the risky action? How did this compare with the gain (advantage) of the alternative possibility? What about the potential loss in either the risky or less risky situation?

1.2 Individual Differences

Objectives/ Student Behavior: Describe the reasons for individual differences in risk acceptance.

1.3 Group Influence

Objectives/ Student Behavior: Given a description of a social situation involving young drivers, identify group influence on individual behavior and suggest alternative responses that would have been more appropriate (safer and no loss of status within the group). The same objective could be applied with students using situations from their own experiences.

Learning Activities: List how peer pressure influences our driving.

1.4 Other Influences

Objectives/ Student Behavior: Given a description of the physical and mental condition of a vehicle operator, predict the level of risk to be expected as a result of the operator's condition.

Learning Activities: Does a vehicle operator always select the same alternative when confronted by the same situation? If not, what factors cause different reactions? Have you observed any examples in recent weeks to illustrate your previous answer? What controls are you going to impose on yourself to help you select appropriate responses consistently?

Content

1.0 Values, needs and emotions influence the degree of risk that we are willing to assume in driving (risk acceptance).

1.1 Risk acceptance is influenced by our evaluation of the risk compared to the potential gain of assuming the risk. What is at stake and what are the odds?

A. Sometimes risks are taken in order to:
   1. save time;
   2. gain status;
   3. experience a thrill;
   4. satisfy our ego; and
   5. punish ourself and others.

B. Operator decisions typically balance a high probability of a small gain against a low probability of disastrous loss.
   1. To gain a few seconds in time, an operator will risk a dangerous passing maneuver.
   2. Because other ingredients needed to cause a collision were not present, operators are frequently successful in realizing small "gains" from accepting traffic risks, compared to a very low "failure" rate evidenced by collision involvement (tends to build up a false sense of immunity).
   3. Few operators are cognizant of the insignificant total time saved by shaving a few seconds here and there by speeding or other risk acceptance.
   4. Tendency to maximize the gain and minimize the probability of failure.
   5. Risks are an inevitable part of living but the irresponsible person takes unnecessary risks when there is little if anything to gain.

1.2 Some operators have a higher tolerance to risk than others.

A. An operator's personal-social needs and values, which are not always compatible with safety, have a strong influence on risk acceptance.

B. Operators may have a greatly distorted concept of risk due to faulty analysis and prediction of the traffic scene (especially true with young drivers whose driving experience is limited).

C. Younger drivers are inclined to take more risks than older drivers.

D. Risk acceptance of men seems to be higher than it is for women.

1.3 The desire for status and security within a preferred group has a strong influence on risk acceptance.

   A. Young people, especially, sometimes use an automobile to gain social acceptance. (Everyone needs to belong to a group, to be accepted by others.)

   B. Individuals tend to conform to the driving habits which prevail in the group to which they desire to belong. One must guard against being swept up with a group and committing foolhardy acts with a vehicle.

   C. The popularity of reckless conduct among some adolescent groups stems partially from their need to rebel against the authority of parents and teachers.

   D. Girls can influence the driving behavior of boys. The reverse is also true.

1.4 The same operator may be willing to assume more risk at one time than another. Our driving behavior, in general, fluctuates on a continuum from safe to unsafe behavior.

   A. Although risk is inescapable in driving, the operator is usually able to determine the degree of risk that is acceptable.

   B. Risk acceptance may be affected by hurry, emotional state, physical condition, passengers, trip purpose, alcohol, distraction and other influences. We need to identify and correct for these transitory conditions.

   C. Reason tends to abandon the hopelessly hurried and frustrated person so that "poor" risks seem highly acceptable.

   D. A person might accept unusual risk in preference to the certainty of getting "bawled out" by a coach, parent or friends for being late.

   E. Deliberate choices that look beyond the pleasure, thrill or other attraction of the moment and consider the possible or inevitable consequences, are more appropriate than impulsive choices.

Pre/Post Assessment

Risk Acceptance

1. Younger drivers tend to take more risks than older drivers.
   _____True _____False

2. Girls can influence (good and bad) the driving behavior of boys.
   _____True _____False

3. A good driver can eliminate risk.
   _____True _____False

4. The reason most people take risks is
   _____A. to satisfy their egos.
   _____B. to save time.
   _____C. to gain status.
   _____D. to experience a thrill.

5. Which of the following is correct concerning risk?
   _____A. There is a certain amount of risk whenever a person drives.
   _____B. Our risk acceptance does not change.
   _____C. The lower our risk acceptance, the higher the amount of insurance we should carry.
   _____D. When there is potential gain from our driving actions, there is no risk.

Pre/Post Assessment Answers

Risk Acceptance

1. True
2. True
3. False
4. B
5. A

Textbook References

Risk Acceptance

Drive Right.
pp. 272-273 (1977)
pp. 260-263 (1982)

Driving: A Task Analysis Approach.
pp. 134-136

In the Driver's Seat.
pp. 111, 148, 246

Learning to Drive: Skills, Concepts, and Strategies.
pp. 115-120, 133, 130-137

Safe Performance Driving.
pp. 120-121, 140

Tomorrow's Drivers.
pp. 80-81

Unit A: Self-Improvement

2.0 Self-Analysis and Improvement

Principle: This concept urges the student to answer these questions: What kind of driver am I now? What kind of driver do I want to be? How can I get to where I want to go? As with concept 1.0, learning activities should involve students in active searching for answers to relevant questions, rather than a passive listening to pearls of wisdom from the teacher. Asking students to draw on personal experiences and observation would encourage self-analysis in the future. To manage effectively the question-discussion method suggested in this and other units, the teacher must step out of the customary role as the respository and conveyor of knowlege and become more like a counselor. The teacher must listen more than talk, and avoid "preaching" when talking is inevitable. In short, the teacher should provide meaningful situations (questions and other stimuli) that provoke thought and encourage self-analysis as an essential step toward self-improvement. The content presented here is to give the teacher some ideas for developing questions and other devices to provoke thought and discussions.

2.1 Self-Concept

Objectives/ Student Behavior: Define the term "self-concept," and explain how our self-concept influences our behavior.

2.2 Young Drivers

Objectives/ Student Behavior: Given a list of traits that influence driving performance, identify those which tend to characterize young drivers.

Learning Activities: What assets do young drivers have over their parents? What liabilities? How can these liabilities be minimized? How do you account for the fact that young drivers have a disproportionately higher share of accidents for their numbers?

2.3 Assets and Liabilities

Objectives/ Student Behavior: Given a list of traits which influence driving performance, distinguish those that promote from those that interfere with competent performance on the highway.

Learning Activities: What acts of expression have you noticed in others, triggered by the vehicle? What was the effect on driving and school performance? What does the vehicle do to you or for you? Does this influence help or hinder your driving and school performance? If you were a parent, what rules would you set up for your son's or daughter's use of the car?

2.4 The Driving Environment

Objectives/ Student Behavior:	Explain why our highway behavior may be less personal than our behavior in other settings where we interact with people.
Learning Activities:	Discuss how the "real you" shows in your driving.

2.5 Vehicle Influence

Objectives/ Student Behavior:	Predict the effect that motor vehicles will have on your life during the next five years.
Learning Activities:	Discuss the changes the transportation industry has gone through in the lifetime of the students.

2.6 Improvement Factors

Objectives/ Student Behavior:	Indicate why some students following driver education will continue to move toward excellence as highway users, while others will show little improvement.
Learning Activities:	Discuss "Why I will be a good driver."

2.7 Do-it-Yourself

Objectives/ Student Behavior:	Develop a set of practical guidelines for implementing a self-analysis and self-improvement program as a highway user.
Learning Activities:	What traits mark the highly proficient (expert) driver? What are your main strengths as a driver? Your main weaknesses? What feelings or attitudes brought on by the vehicle would you like to discard or change? Is it possible for people to change either their needs and feelings, or their effect on driving? How? Would you state a way in which you might drive differently during the coming week—something which is under your conscious control? How many of you are willing to make this modification for one week, and then report to us next week on how this change affected your experiences on the road?

2.8 Safety for . . .

Objectives/ Student Behavior:	Summarize your beliefs (philosophy) regarding "safety" as a value in competition with other values.

Content

2.0 Our proficiency levels as operators can and should move toward excellence through self-evaluation and a continuing learning process.

2.1 The way we look at ourselves (self-concept) as persons and as drivers significantly influences our behavior.

A. When operators understand themselves, they are better judges of what they can do and cannot do behind the controls.

B. Self-understanding also helps us to understand and anticipate the actions of other highway users—to realize that they have limitations also. (Their limitations may be different from ours.)

C. If you see yourself as a courteous person, you will do courteous things; as a consequence, you will probably be treated courteously by others (self-fulfilling prophecy).

2.2 Young drivers are most susceptible to accidents at the time when they have the greatest potential to be skillful.

A. May use the automobile to release tensions, restrictions and other frustrations associated with growing up.

B. Frequently they lack the experience and judgment to evaluate traffic situations accurately and decide the best course of action.

C. Driving proficiency of youth will be adversely affected by alcohol, passengers and other distracting factors—more so than with experienced drivers.

D. Young drivers often attempt maneuvers that test the limits of their fast reflexes and manual dexterity.

E. Young people tend to discount their weaknesses and assume that adult counselors are overly cautious.

2.3 Some value elements promote and some interfere with both effective living and effective driving.

A. Creative forces leading to operator competence are acts of expression which reflect:
1. pride in competent driving and a desire to improve;
2. tolerance and courtesy toward the actions of other highway users;
3. respect for traffic laws and enforcement;
4. patience and alertness; and
5. readiness to accept bad behavior from others without malice.

B. Certain value elements cause responses which interfere with effective performance as a highway user. Examples of these beliefs, attitudes and habits of thinking are:
1. over-confidence;
2. competitiveness;
3. stereotyping other drivers;
4. fatalism;
5. feeling of immunity;
6. making unreasonable assumptions about the actions of other highway users; and
7. blame transfer.

C. Our needs and values are reflected in overt behavior, so we can tell something about ourselves and others by what we see or hear on the highway.
   1. Do we keep our car in good condition?
   2. Do we drive with enough concentration to recognize and avoid potentially hazardous situations or do we permit distractions outside the vehicle, within the vehicle or within ourselves, to interrupt our concentration?
   3. Rather than being upset by the errors of other operators, do we allow and compensate for these errors, realizing that at times we commit the same errors?
   4. Do we drive at a sensible speed and blend with traffic?
   5. Do we obey the rules of the road—or do we "run" lights, pass on hills and curves or commit other illegal and unsafe acts?
   6. Are we unobtrusive as a driver, or can you hear us because of excessive and inappropriate use of the horn, noisy exhaust, excessive tire squeal or blaring car radio?
   7. Do we treat the vehicle as a convenient and pleasant means of going places—or do we regard it as a toy for playing thrill games?
   8. Are we calm and alert even under difficult and frustrating situations as opposed to being nervous, impatient and irritable?
   9. Do we avoid driving when unfit for the task?
   10. Are we big enough to admit our mistakes in traffic, or are we inclined to rationalize or blame others?

2.4 The vehicle does not change you or your basic values, but the depersonalized nature of the driving environment may cause less courtesy, less tolerance, less friendliness and less of all desirable human qualities.

A. Specific attitudes toward driving are not an isolated part of the operator's personality, but rather a projection of it.

B. An operator becomes an extension of the vehicle, and tends to view other operators as parts of their vehicles, which has the effect of watering down the human feeling (tend to treat other drivers as "things").

C. Vehicles provide avenues for the expression of the character, temperament and self-concept of the operator. (What does the vehicle do to you and for you?)

D. Driving an automobile is one aspect of contemporary life which makes it possible for persons to express hostility, discourtesy and emotional conflict without much fear of reprisal, and often with complete anonymity.

E. Responsible operators control their negative and destructive tendencies with positive and creative motives within themselves (self-discipline) despite their anonymity as drivers. Examples are:
   1. tolerance over retaliation;
   2. patience over impulsiveness;
   3. self-preservation over thrill seeking;
   4. responsible behavior over irresponsibility;
   5. courtesy over rudeness; and
   6. poise over panic.

2.5 Some young people become so absorbed in motor vehicles that they neglect school work and other responsibilities basic to their development.

A. Studies reveal that the amount of vehicle use by a high school student relates to academic standing.

B. Holding a job to support a vehicle can affect the student's attitude toward school.
   1. May lose interest in studies, athletics and other activities.
   2. Cuts away from an important part of the purpose and meaning of school life.
   3. May drop out of school.

C. The use of the family car(s) is an issue in many families which requires an intelligent and cooperative solution.

2.6 Traffic education can only help you to establish a foundation upon which to build the characteristics needed for a successful driving career.

A. You will never know all there is to know about anything, and this is particularly true of driving. It is what you learn after you know it all that makes for excellence.

B. Your parents may be better drivers than you are, simply because they have more experience. However, experience does not assure the development of competency. Experience helps only when you learn from it. This explains why some older drivers are not capable of handling modern traffic conditions.

C. Young operators must develop judgment beyond their years if they are going to accept the responsibilities brought about by the power and freedom of motor vehicles.

D. In striving for excellence in driving, one competes only with self. Satisfaction and rewards make the effort worthwhile.

E. Driving is a task worth doing well when you consider the number of hours you will spend behind the controls of a motor vehicle and the potential danger which accompanies this activity.

F. Learning to control the vehicle (motor skills) is relatively easy to learn, but learning to control yourself and the traffic environment presents a real challenge.

G. It is possible to be either a competent or incompetent operator with the same degree of knowledge and physical skill.
   1. A rather unskilled operator may still be permitted on the road if, on the basis of a strong feeling of responsibility, the manner of driving is adjusted to the degree of proficiency.
   2. On the other hand, no driver with adequate or even exceptional skills, should be permitted to drive if proficiency is not supported by a sufficiently developed social feeling of responsibility.

H. Competent driving is somewhat contingent upon the development of a sound personality, because the inter-personal reactions of the operator depend on the mental and emotional adjustment toward self, other highway users, authority and other factors.
   1. Driving behavior simply reflects what kind of person you are.
   2. The person behind-the-wheel is acting out that particular individual's personality.

2.7 Young people who are dissatisfied with the value element controlling their behaviors can change.

A. Undesirable value elements acquired in childhood can be discarded or modified because now you have more control over your environment and more opportunity to make decisions.

B. If you change some of your attitudes and feelings, the things that you do will change. (If you see traffic laws differently, you will behave differently.)

C. Unfortunately, your task will not be easy—attitudes remain until experience changes them and then tend to resist change.
   1. We tend to withdraw from situations—people, articles and experiences—that threaten our attitudes.
   2. Attitudes closely related to one's self-concept and self-esteem are far less easily changed than the non-ego involved attitudes.
   3. It's difficult to change an attitude that may mean rejection by social groups in which we are accepted, even though it is the intelligent thing to do. (Hard to stick your neck out but self-esteem will be increased if you do what you know is right.)

D. Nevertheless, if young people are serious about becoming expert in driving, they can devise and implement a do-it-yourself plan for improving their value structure and driving behavior.
   1. Examine your value indicators and decide which ones are assets and which ones liabilities. (Who is driving this car—I or an attitude that will cause me trouble?)
   2. Seek reliable information about the beliefs upon which your attitudes are based.
   3. Analyze the personal needs served by your antisocial and ineffective acts of expression, and then develop a substitute plan for fulfilling those needs. Social status can be promoted through traits which typify driving competency, since most groups value cooperation, responsibility, self-control, courtesy and common sense.

2.8 If people are to realize a life of creative usefulness and personal fulfillment, they must perceive safety as a positive and dynamic value functioning in concert with other individual and social values.

A. Safety as a value at times competes with time, status and group pressures, personality shortcomings, loyalty, bravery, adventure and other values.

B. Safety enables us to choose between experiences that are unproductive, absurd and even stupid, and those that enrich our lives, make it interesting and worthwhile.

C. As the operator of a motor vehicle, giving due regard to safety increases the probability for achieving life's short- and long-range goals. Safety is a means to an end—adventure, progress, achievement of goals (safety for as opposed to safety from).
   1. Safe driving helps us to reach a certain destination to accomplish some purpose. By continuing to reach these destinations, with a good driving record, we maintain the privilege of driving the family car and eventually our own vehicle.
   2. Indirectly, the driving privilege helps us to accomplish other objectives, such as, making the band or the team, graduation from high school or college, achieving career aspiratons, marrying and having a family, and enjoying other pleasant and profitable adventures of life.

Pre/Post Assessment

Self-Analysis and Improvement

1. "The better the driving skills, the less the number of accidents," is true for all classes of drivers.
   _____True _____False

2. A driver with the correct values will admit faults and not blame them on others.
   _____True _____False

3. Students who own an automobile in high school are statistically better students.
   _____True _____False

4. Two people with the same skill and driving knowledge will show the same driving competency.
   _____True _____False

5. Which of the following gets drivers into the most trouble?
   _____A. Lack of skill
   _____B. Lack of knowledge
   _____C. Lack of experience
   _____D. Attitude

6. You can usually tell something about an individual's values concerning driving
   _____A. by seeing how they keep up their car.
   _____B. when you find out if they have had an accident.
   _____C. by what they say when they get a license.

7. The aim of a traffic education course would best be described by which of the following?
   _____A. To have students stop at the stop sign because otherwise they could receive a ticket.
   _____B. To have students stop at the stop sign because they have been trained to do so.
   _____C. To stop at the stop sign because it is a part of the driver's value system.

8. Which of the following would best describe self-discipline in driving?
   _____A. Honking at the driver of a stalled vehicle.
   _____B. Allowing another vehicle the right-of-way when it was really your turn.
   _____C. Going a little faster than usual when your friends are in the car.
   _____D. Not asking to drive a car until you are 18.

Pre/Post Assessment Answers

Self-Analysis and Improvement

1. False
2. True
3. False
4. False
5. D
6. A
7. C
8. B

Textbook References
Self-Analysis and Improvement

Driving: A Task Analysis Approach.
pp. 14, 185, 190-191

In the Driver's Seat.
pp. 22

Safe Performance Driving.
pp. 386-387, 426

Tomorrow's Drivers.
pp. 158-159

Unit B:
System Improvement

Unit B: System Improvement

Concepts:

1.0	Traffic Law Enforcement
2.0	Traffic Engineering
3.0	Driver Licensing

Content

Pre/Post Assessment with Answers

Reference and Resource Materials

Unit B: System Improvement

1.0 Traffic Law Enforcement

Principle: Usually, a community has a quality of traffic law enforcement commensurate with the understanding, interest and support of the citizens. Therefore, in this concept emphasis is placed on the benefits that individuals and society derive from traffic law enforcement, and how highway users can influence the quality of traffic laws, police traffic supervision and traffic courts. The ultimate purpose is to help students develop a mature sense of responsibility as they relate to the traffic law enforcement function.

1.1 Kinds of Traffic Laws

Objectives/ Student Behavior: Define the different kinds of traffic laws and describe their purposes.

Learning Activities: Discussion questions:

- Why do we have traffic laws?
- What different kinds of traffic laws do we have and for what purposes?
- Which laws do I need to know now?
- Under what future conditions will I need to know other traffic laws?

1.2 Conformity

Objectives/ Student Behavior: Contrast the reasons for and the possible benefits to the individual of obeying versus disobeying traffic laws (rules of the road).

Learning Activities: Questions—assigned for homework and then discussed in class.

- Why are traffic violations committed?
- Why do highway users comply with the law?
- How do you feel about obeying and disobeying traffic laws?

Analyzing traffic situations where one or more law violations are committed.

- What violation(s) was committed?
- Why did the person violate?
- What are the potential consequences?
- What would you have done in this same situation?

1.3 Quality Enforcement

Objectives/ Student Behavior: Given a description of traffic laws and general enforcement measures in a community, identify the strengths and weaknesses of the program.

Learning Activities: Questions:

What characteristics must traffic law enforcement include if observance is to be widespread?

How should we react to unreasonable traffic laws?

1.4 Police Traffic Supervision

Objectives/ Student Behavior: Describe the functions of traffic police.

Learning Activities: Questions:

What duties have you seen traffic police perform?

What equipment and training do they need to perform these duties?

How do you feel about police using unmarked cars and radar to catch speeders?

Should police chase a traffic violator who is speeding 2 mph over the speed limit?

1.5 Violator-Police Relationship

Objectives/ Student Behavior: When given a description of a police officer stopping a motorist for a traffic violation, including dialogue, (1) evaluate the behavior of both the officer and the violator, and (2) hypothesize about the motivation which prompted the participants to behave as they did.

Learning Activities: Role playing: A police officer stopping a driver for a traffic violation.

Questions:

Should police chase a driver who "runs" when directed to stop?

What changes occur from childhood through adulthood in attitude toward police?

1.6 Traffic Courts

Objectives/ Student Behavior: Given a case description of a traffic violator appearing in court, evaluate the characteristics of the court and the behavior of the participants.

Learning Activities: Field trip: A small group of students visit a traffic court session and report their findings to the class.

Role playing:

1. Dramatize a traffic court session with students playing the roles of judge, violator, clerk, police officer and witnesses. The rest of the class serves as a jury.

2. A violator at the Violations' Bureau complaining about a $5 ticket. Class analyzes the attitudes of the violator.

Content

1.0 Traffic laws and ordinances are designed to create orderliness, convenience and protection on our highways.

1.1 Traffic laws cover many subjects. Most of these laws can be integrated throughout the curriculum where they relate to a task.

A. Certificate of title and registration of vehicle laws serve as a proof of ownership and, in addition:
   1. protect you from purchasing a stolen vehicle;
   2. aid enforcement officials in recovering stolen vehicles; and
   3. help the police to locate you in an emergency.

B. Anti-theft laws are designed to prevent unauthorized use of a vehicle, damaging or tampering with a vehicle, and other unwarranted acts.

C. Financial responsibility laws help to protect the public from the uninsured motorist.

D. Civil liability laws govern the civil rights of one party to collect damages from another party in the event of a collision.

E. Laws regarding accidents and accident reports specify the responsibilities of persons involved in accidents in order to minimize the consequences and to furnish data for proper settlement.

F. Vehicle equipment and inspection laws aim to prevent drivers from operating on public highways a vehicle which is in such unsafe condition as to endanger any person.

G. Laws dealing with highway administration are designed to create efficiency within and between various agencies and departments (federal, state and local) responsible for some phase of the highway transportation system.

H. Size, weight and load laws govern those features in order to minimize delay, danger and damage created by unreasonable sizes, weights and load of vehicles.

I. To protect the public from unscrupulous practices, a body of laws govern dealers, wreckers, rebuilders and owners of for-rent vehicles.

J. Driver licensing laws help toward insuring that only persons physically and mentally qualified may drive, and prevent unjustified denial of the privilege to drive.
   1. Driver licensing laws furnish a social device by controlling and sometimes suspending or revoking the license of drivers who are not willing to respect the rights of others.
   2. Driver licensing laws should provide for a driver improvement program based on a point system to assign a certain weight to different violations, with a plan to help problem drivers or restrict those who do not respond to driver improvement efforts.
   3. Some of the most serious and willful violations carry mandatory revocation or jail sentence. For example, driving under the influence of alcohol or drugs; driving while under suspension or revocation; leaving the scene of an accident; and others.

K. Rules of the road establish specifications for conventional behavior so that highway users have some basis for predicting each other's behavior.
   1. These rules of social conduct cover: (a) obedience to and effect of traffic laws; (b) traffic signs, signals and markings; (c) overtaking and passing; (d) right-of-way; (e) pedestrian's right-of-way and duty; (f) starting, stopping and turning; (g) speed restrictions; (h) serious traffic offenses; (i) stopping, standing and parking; (j) operation of motorcycles, bicycles and play vehicles; and (k) miscellaneous rules.
   2. Rules of the road represent arbitrary standards of conduct which do not provide for variations in individual differences.
   3. As a practical matter, generalized concepts are used to prescribe behavior in some situations, so the highway user's best judgment and decision-making capabilities are required to apply intelligently the generalities of the law to the reality of traffic situations ("reasonable and prudent"; "so close thereto as to constitute an immediate hazard"; "within the assured clear distance").
   4. Uniformity reduces chances for misinterpretation and resulting confusion and delays.

1.2 Various factors can (or should) influence the responses of highway users to traffic laws.

A. Traffic violations are committed because operators and pedestrians are:
   1. ignorant of the law or the details of its requirements;
   2. preoccupied or distracted and inadvertently fail to comply;
   3. physically or mentally deficient or affected;
   4. intentionally disobeying the law (many possible reasons here).

B. Highway users comply with the law because:
   1. they understand the law and approve its requirements;
   2. the requirements of the law fit the operator's own standards of conduct and action;
   3. of sheer respect for law regardless of personal wishes to act differently;
   4. of pride in a clean record;
   5. they fear the inconvenience, embarrassment or punishment that might result;
   6. they wish to set a good example (parent or traffic education teacher);
   7. it is the "smart" thing to do.

C. Most operators are tremendously aware of formal law and restrictions imposed upon them on crowded highways, but the driver's anonymity and the legalistic nature of the traffic environment tend to depersonalize and diminish personal ethics and sense of duty with respect to the rights of others.
   1. The motorist who is driving 40 mph in a 30 mph zone knows the law is being violated, even if the street is clear and no one is in danger. But if the motorist drives 30 mph when the street is congested and it is dangerous to others, that is all right because the posted limit is 30 mph. However, that driver is not observing the moral obligation or the basic speed law which imposes an obligation upon the driver to operate the vehicle in a manner which will not endanger self or others.

D. Conformance to traffic laws—in addition to decreasing the chances of an accident, fine, jail sentence, loss of driving privilege, or criticism and embarrassment—can produce positive gains for the individual, such as:
   1. peace of mind;
   2. increased self-esteem;
   3. parental approval resulting in more driving privileges;
   4. pride in a clean record;
   5. social approval, creating a better image of young drivers;
   6. more enjoyment of driving when fear of apprehension is removed; and
   7. increased probability of reaching your destination in time and without incident.

E. Major traffic crimes can result in serious and permanent consequences for the offender. (Motor vehicle homicide, neglect of duty following an accident, trying to outrun the police, illegal possession of beer or other alcoholic beverages in the car, drinking and driving afterwards, drag racing, reckless driving, "borrowing" a car without permission, and others.)
   1. Your behavior on the highway can cost you the privilege of your driver's license.
   2. Your chances for employment, and the opportunity to become prominent in business, industry and government, would be markedly reduced.
   3. To carry through life the guilt of a highway homicide caused by your negligence would be a heavy burden.

F. Because some adults at times act immorally, stupidly, unsafely and even viciously, this is no excuse for young people to follow suit. Human nature in general and traffic behavior in particular can and must improve.

1.3 Good traffic law enforcement, like any other kind of good government, depends upon the acceptance of responsibility by both officials and citizens.

A. It is each individual's job to evaluate and support good law enforcement in the community and elsewhere. We are members of the community that enacted the law.

B. The deterrent aspect of traffic law enforcement will be effective to the degree that highway users:
   1. understand the laws;
   2. believe in the reasonableness of the laws (unreasonable laws are an obstacle to traffic movement and in addition breed disrespect);
   3. believe in the likelihood of being detected and apprehended if they violate; and
   4. believe in the certainty and adequacy of the penalty which will result.

C. We are under the eye of enforcement for a relatively small percentage of the time we are on the highway; therefore, our own desire and conscience are the most practical police. This means accepting and adopting certain disciplines and practices which we perform as a matter of our own compulsion.

D. The responsible person obeys unreasonable as well as reasonable traffic laws, but works through appropriate channels toward revising the unreasonable.

1.4 The role of police traffic supervision in highway safety is the same as in other phases of law enforcement: the protection of life and property and the preservation of order.

A. Traffic police accomplish this mission through:
   1. enforcement of traffic laws—to protect highway users from their own unlawful behavior and that of others, the police officer is duty-bound to detect, apprehend and aid in the prosecution of traffic violators;
   2. investigation of traffic accidents; and
   3. the direction and control of traffic (at busy intersections, sports events and other special occasions, and in emergency situations police officers expedite the movement of traffic by personally directing drivers and pedestrians).

B. In addition, they provide a variety of services designed to facilitate the safe and efficient movement of traffic.
   1. A portion of the traffic officer's time is spent in servicing and assisting the motorist who has a flat tire, empty gasoline tank, spilled load, and other troubles. These conditions interfere with traffic flow and often jeopardize the affected motorist and other highway users.
   2. In addition to protecting the highway user, the police officer also has a responsibility for protecting the highway from damage, misuse and litter.
   3. As voluntary compliance with the legal requirements of driving increases, the need for police traffic supervision decreases, so police officers encourage compliance by informing highway users of laws, hazards and consequences of illegal acts (press, radio, television, schools, etc.).

C. To realize the potential of police traffic supervision, reflected in the preceding stated functions, society needs nothing less than an adequate number of carefully selected, highly trained individuals with vehicles and modern scientific devices for enforcement, accident investigation and traffic flow regulation.

1.5 If we think and act as responsible persons when accosted or directed by a police officer, we help the officer, the community and ourselves.

A. The most stupid and dangerous behavior is to run from the police because once the chase starts the officer has the right and duty to follow no matter where you go. A chase can result in the senseless loss of life and property of innocent bystanders.

B. If ordered to pull over to the curb:
   1. do so immediately;
   2. if you disagree with the charges, state your position clearly and courteously, but do not be argumentative; and
   3. present your driver's license and sign the citation if requested. (This does not mean that you admit guilt.)

C. Remember that a police officer is authorized to investigate a car parked in "lovers' lane" or another secluded spot since:
   1. carbon monoxide could be present;
   2. a robbery may have been committed in the area;
   3. a car could have been stolen;
   4. a parent may have reported that a child has not returned from a dance; and
   5. an escapee from a mental institution or jail may be in the area. (Attacks by criminals on young people in parked cars appear to be increasing.)

D. If a police officer approaches, you have the advantage of knowing the officer's identity (uniform, marked car, badge, gun), but the officer has no way of telling whether you are a criminal or the finest citizen. If you were the officer, think how you would react to a well-mannered young person compared to one who displays resentment and uses disrespectful language.

E. Reasonable allowances must be made for inevitable errors of judgment and normal traits of impatience and anger in the performance of police traffic supervision. (Police officers are human beings.)
   1. The job involves many frustrations and the officer may be reacting to a problem from hours before. The officer may have just left the scene of a fatal or injury accident that resulted from someone doing what you have been stopped for.
   2. You will find an occasional "rotten apple" in police work, as in all vocations, but we err in condemning the entire department for the behavior of a few.
   3. We cannot justify repeating critical stories about police, or anyone, based on hearsay because these tales are often distorted or completely false (ticket quotas, speed traps, etc.).

F. No one needs to fear police action if no violation has been committed.

1.6 The distinctive function of traffic courts is to give fair and impartial justice to those arrested for traffic violations, but, like the police, their broad objective is to deter drivers from violating the law and to encourage voluntary compliance.

A. Unfortunately, many people think that a judge's only function in a traffic case is to punish the violator, but a more important function is to improve drivers by helping them to understand the logic for traffic laws and convincing them to comply as a means of making our streets and highways safer (corrective penalization).

B. Traffic court judges are in a unique position to educate and correct the behavior of highway users.
   1. At the beginning of the traffic court session many judges present a brief talk designed to inform violators on the causes and preventatives of traffic accidents, with particular emphasis on individual responsibility.
   2. The competent judge also helps the alleged violator to see the unsafe and unintelligent aspects of the individual violation, so that the driver is more likely to conform to traffic laws in the future.
   3. When it appears to the court that a violator might benefit from a formal educational experience, the violator may be assigned to attend a driver improvement (traffic violator) school, either as the total penalty or as a portion of the penalty for the violation committed.

C. Experience in traffic court can make or break the individual's respect for the laws that govern conduct on the highway, and also respect for our judicial system in general.
   1. It is estimated that of all the people who appear before a court, 95 percent appear for traffic offenses and in most instances their impressions gained from this experience are their only firsthand knowledge of our judicial system.
   2. The driver who leaves the court with satisfaction and respect for the way the case was handled is less likely to return as a violator.
   3. Without effective working support of the courts, police enforcement processes also tend to become lax or arbitrary, thus creating disrespect for the entire field of traffic law enforcement. (Need for uniform interpretation and adequate penalties; also, elimination of overloading of court dockets, "fixing," and favoritism.)

D. When court handling of violators is effective and when penalties are certain, swift, impartial and adequate, there is a community-wide benefit.
   1. Judges need the backing of citizen leaders and the public assurance that citizens want impartial handling of all traffic cases.
   2. The American Bar Association advocates citizens learning more about their judges and courts by engaging in a program entitled "Go to Court as a Visitor Not a Violator" (designed to stimulate citizens to work with the judge toward improving the court).

E. A person cited for a traffic violation and requested to appear in court to answer the charges will be prepared to respond more intelligently if the person understands the legal process.
   1. Usually the defendant receives a summons or citation called a ticket, which will indicate where and when to appear.
   2. Sometimes the case can be "disposed of" by mail or by appearing at the Violations Bureau.
   3. If the case is handled in court, violators (defendants) hear their rights before the court and the exact charges are read. The defendant is asked to plead guilty or not guilty.
   4. Pleading "guilty" is the same as saying "I did what is charged," and usually carries a penalty of a fine, imprisonment or an adjournment to attend a driver improvement school. Do not plead guilty just because it is the cheapest or easiest way out at the moment.
   5. If the defendant pleads "not guilty," the judge then determines a time for the trial where the evidence will be presented. It may be immediately.
   6. The defendant may have the case continued until a later date in order to prepare defense and/or to obtain a lawyer. This request must be made when the defendant is first called to the bench.
   7. To prepare for trial you should: analyze the statute or ordinance under which you are charged; interview any defense witnesses and require, in advance, their attendance at the trial; and organize your defense in a logical manner.
   8. At the trial, which may be before the judge only or before a jury, the defendant has the right of cross examination and the opportunity to present the defendant's side of the case, following direct presentation of evidence by the prosecution. Be brief and do not argue with witnesses or the prosecution.
   9. After both sides have presented their cases, the judge or the jury decides guilt or innocence.
   10. The defendant has the right of appeal from any decision which is felt to be wrong or unjust.

Pre/Post Assessment

Traffic Law Enforcement

1. Law enforcement is the total responsibility of enforcement officials.
   _____True _____False

2. One purpose of law enforcement is to protect drivers from potential accidents.
   _____True _____False

3. When you know you have not broken a law, it is not a law that you have to stop for an enforcement officer if requested to do so.
   _____True _____False

4. The major function of traffic courts is to deter drivers from violating the law and to encourage voluntary compliance.
   _____True _____False

5. The driver who leaves the court with respect for the way the case was handled is less likely to return as a violator.
   _____True _____False

6. You can have a trial by jury for a traffic offense if desired.
   _____True _____False

7. If stopped for a potential traffic offense, it is best to stay in your vehicle.
   _____True _____False

8. Which of the following is necessary to maintain your driving privilege?
   _____A. Responsible driving
   _____B. Parallel parking
   _____C. Steering
   _____D. Speed control

9. What is a major problem with traffic courts today?
   _____A. They are satisfactory.
   _____B. Some judges are not qualified.
   _____C. Too many cases to handle properly.
   _____D. Some judges are too lenient.

10. Who makes traffic laws?
    _____A. City government
    _____B . State government
    _____C. Federal government
    _____D. Highway Patrol

11. Which of the following traffic offenses are kept on record in Helena?
_____A. Driving while intoxicated
_____B. Driving revocations
_____C. Manslaughter record
_____D. All of the above

12. The deterrent aspect of traffic enforcement will be effective to the degree the driver
_____A. believes in the certainty and adequacy of the penalty which will result.
_____B. fears law enforcement officials.
_____C. believes laws are necessary.

13. Why are obviously bad drivers allowed to keep driving?
_____A. Laws are too lenient.
_____B. Physical examinations are not tough enough.
_____C. Many drive well without a license.
_____D. All of the above.

Pre/Post Assessment Answers

Traffic Law Enforcement

1. False
2. True
3. False
4. True
5. True
6. True
7. True
8. A
9. D
10. A & B & C
11. D
12. A
13. A

Appropriate Instructional Materials

Traffic Law Enforcement

"Uniform Vehicle Code and Model Traffic Ordinance," NCUTLO, Suite 430, 1776 Massachusetts Ave., N.W., Washington, D.C. 20036.

"Montana Motor Vehicle Code," Montana Highway Patrol Bureau, Helena, MT 59620.

Textbook References

Drive Right.
pp. 351 (1977)

Driver Education and Traffic Safety.
pp. 144-174

Driving: A Task Analysis Approach.
pp. 9, 249-250

Driving with Car Control.
pp. 221-238

Learning to Drive: Skills, Concepts, and Strategies.
pp. 88-90, 122, 133

Safe Performance Driving.
pp. 265-266, 325, 343-348, 387-390, 392-394, 402-426

Sportsmanlike Driving.
pp. 118-125

Tomorrow's Drivers.
pp. 4, 233-234

Unit B: System Improvement

2.0 Traffic Engineering

Principle: The purpose of this concept is two-fold. First, an understanding of the roadway and the problems that the traffic engineer faces in regard to the roadway can be helpful to the beginning driver in understanding the driving task. Traffic engineering can make it easier for drivers and pedestrians to avoid mistakes. Second, if one of the goals of driver and traffic safety education is to produce informed and active participants (beyond driving) in the highway transportation system, then the students should be exposed to the traffic engineering function and problems.

2.1 Traffic Engineering Function

Objectives/ Student Behavior: Define traffic engineering and classify the functions performed by traffic engineers (plan, design, operations).

Learning Activities: Have a group discussion concerning the responsibilities of a traffic engineer. Identify examples from the community to illustrate the traffic engineer's handiwork.

2.2 Turbulence

Objectives/ Student Behavior: Classify the factors which cause turbulence in traffic movement.

Learning Activities: Students observe traffic movement at a peak period and classify the factors which impede traffic flow.

2.3 Uniformity

Objectives/ Student Behavior: Describe traffic situations where lack of uniformity in a sign, signal or road marking could cause driver confusion.

Learning Activities: Students present examples of "lack of uniformity" in signs, signals and markings which they have observed and how highway users were or could have been affected.

2.4 Warrants

Objectives/ Student Behavior: Identify the factors that traffic engineers consider in determining proper limits and also the installation of signs and signals.

Learning Activities: Students learn about warrants through a reading assignment and then observe local situations to determine if recommended warrants were applied.

2.5 Tools

Objectives/ Student Behavior:	Given a spot map, collision diagrams, flow maps and other "tools" used by traffic engineers, interpret these devices by answering correctly a series of questions about them.
Learning Activities:	Teacher-led analysis of spot maps, collision diagrams, condition diagrams, flow maps, speed charts, before and after accident records. Student committees, working closely with the local traffic engineer, conduct intersection studies and prepare a report which includes: (1) condition, collision and flow map diagrams, (2) a written explanation of their findings, and (3) proposed recommendations.

2.6 Techniques

Objectives/ Student Behavior:	Given a series of highway scenes (rural, urban and freeways), suggest (hypothesize) ways to improve traffic flow and safety with relatively inexpensive techniques.
Learning Activities:	Evaluate various measures used by traffic engineers to improve driving conditions—one-way streets, turning lanes, parking restrictions, pavement markings, removal of near-roadway hazards, etc.

2.7 Public & Individual Rights

Objectives/ Student Behavior:	Summarize the problems created in locating a new highway and how government attempts to ease these problems.
Learning Activities:	Teacher-led presentation following a reading assignment. A taped recording of an open hearing on the location of a new highway.

2.8 Pressures on Traffic Engineers

Objectives/ Student Behavior:	Identify the problems traffic engineers face in implementing sound ideas and in rejecting unsound suggestions from various sources.
Learning Activities:	Have a classroom interview with a traffic engineer and discuss: What else might traffic engineers do to reduce accidents? What effect do traffic signs and signals have on accidents? If you were the traffic engineer, how would you construct highways differently to make them safer? (Emphasis on available land, funds, time involved, eminent domain, maintaining natural beauty and natural habitat for fish and wildlife, and other related subjects.)

Content

2.0 The traffic engineering function directly and persistently affects the highway user's (driver and pedestrian) tasks.

2.1 Traffic engineering—a specialized branch of engineering—deals with the planning, geometric design and operations of streets and highways as their use is related to safe, convenient and economical transportation of persons and goods.

A. Operates on the principle that official responsibility does not end with the building and maintenance of roads, but that efficient operation of those facilities is also a responsibility of government.

B. The traffic engineer is involved in the development or redevelopment of entire street systems, in the design of a specific roadway, and in using traffic control devices to assure the best use of roadways, new or old. (The best remedy is the one that corrects the situation with the least interference and the least cost.)

C. Where funds are not available for the correction of hazards through reconstruction, the traffic engineer must rely upon the use of traffic control devices to warn motorists of these hazards.

D. The quality of our highway transportation system in the future depends in large measure on the "needs" studies and planning of today. The traffic engineer is part of a team of specialists involved in that kind of planning. These specialists must consider:
1. how land is presently used and forecasts of future use;
2. present traffic patterns and future patterns (based on present and future land usage);
3. limitations in the existing transportation system;
4. predictions of future development in vehicle design and capability; and
5. driver characteristics and limitations.

2.2 Turbulence in traffic stream (stops, starts, changes of speed and direction) reduces street capacity and is one of the most important single causes of vehicle-to-vehicle accidents.

A. The flow of traffic over a network of streets can be compared to the blood stream in the body—any blockages or other irregularities affect the smooth flow not only at that location but throughout the system.

B. Unnecessary traffic signals, signs, parking and other conditions which disturb the smooth flow of traffic should be eliminated.

C. Differences in speed cause vehicle-to-vehicle friction, which justifies the use of minimum as well as maximum limits.

2.3 National uniformity of signs, signals and markings is essential if we are to reduce confusion and increase voluntary obedience on the part of motorists.

A. Traffic signs should be uniform as to application, shape, color and message, and also be reasonably uniform in size and location.

B. Pavement markings, especially those used to designate such regulations as no-passing zones, must be uniform as to color and application.

C. Lack of maintenance of signs and markings encourages disobedience of these devices.

2.4 Stop signs, yield signs, and traffic signals installed at warranted locations assign right-of-way, reduce accident severity and certain types of accidents, and improve traffic efficiency. But unjustified, poorly designed or improperly operated signs and signals can markedly impede traffic movement, increase accidents and breed disrespect for traffic control devices.

A. The judicious use of speed zoning can aid in getting operators to conform voluntarily to speeds which are suited to changing physical and traffic conditions.
   1. The 85th percentile serves as a criterion for determining speed limits (a speed under which 85 percent of the vehicles travel).
   2. Studies have shown that traffic speeds are not much affected by posted speed limits, possibly due to the fact that so many posted speed limits are unreasonably low.

B. Traffic engineers have devised warrants to guide their decisions about the installation of traffic lights.
   1. Warrants take into consideration the volume of vehicle and pedestrian traffic and the ratio of traffic between the intersecting streets.
   2. Traffic signals are not unmixed blessings insofar as safety is concerned—they ordinarily reduce right-angle collisions and increase rear-end collisions.

C. Stop signs should be used where necessary, as based upon a study of physical and traffic conditions at the location.

D. Yield signs can be used to assign right-of-way at low volume intersections where visibility is good.

2.5 Tools used by traffic engineers for studying and evaluating high accident locations are:

A. Spot maps—furnish a quick visual index to concentrations of accidents which warrant detailed analysis;

B. Collision diagrams—show the approximate paths and movement patterns of vehicles and pedestrians involved in collisions;

C. Condition diagrams—a scale drawing of the important physical conditions at a location to be studied;

D. Flow map—indicates the volume and direction of traffic;

E. Speed chart—shows the speed of vehicles approaching the hazardous location;

F. Before and after accident records—furnish a means for evaluating the effectiveness of changes made;

G. Electronic data processing—use of computers to analyze accident data and link data with highway, vehicle and driver information.

2.6 Fortunately, no community has to accept traffic chaos and its penalties (reduced retail sales, lower property values, slowed down community development), because specialists are available who can apply proven traffic engineering techniques to the traffic ills of a community.

A. A major concern of the urban traffic engineer is the development of a system (or network) of principal traffic streets. Given adequate resources and support, the engineer can accomplish this with the help of such tools as:
   1. traffic signal systems which are coordinated to provide a smooth flow of traffic under changing volume conditions;
   2. separate traffic lanes for loading, unloading or transferring passengers at transit stops;
   3. additional traffic lanes on approaches to signalized intersections to facilitate turning movements;
   4. channelization of traffic;
   5. one-way streets;
   6. prohibition of turning movements where it is necessary to increase the capacity of an intersection, or installing special turn intervals (the latter technique takes time ordinarily used for through movements);
   7. pedestrian and highway grade separations in extreme cases to relieve bottlenecks at complex intersections; and
   8. prohibition of curb parking (permitting of parking on major streets is outmoded, but may require the establishment of off-street parking).

B. Rural roads need to be modernized to handle the volume and speed of today's traffic. Many of the following improvements are relatively inexpensive and only require the understanding and motivation of state and county engineers supported by knowledgeable and concerned citizens.
   1. Greater visibility can be obtained across corners at intersections, at sharp curves and at railroad grade crossings by cleaning out shrubbery, removing or relocating signs, etc.
   2. Eliminating steep side slopes and deep ditches, and replacing obsolete guardrail, will decrease the severity of run-off roadway accidents.
   3. Correcting road surfaces having high crowns or which are slippery when wet will help drivers maintain control of their vehicles.
   4. Removing or setting back physical obstructions which are close to the roadway can eliminate a fixed-object hazard and also increase sight distance (mail boxes, trees, poles, signs, etc.).
   5. Substituting modern directional signs for undersized, non-standard, low signs will improve sight distance.
   6. Competent persons should lay out the passing and no-passing center lines so they are reasonably accurate aids for drivers.
   7. Sufficient lane widths for modern traffic are needed to help prevent head-on, sideswipe, and run-off-roadway accidents.
   8. A few dollars for reflective paint can help reduce accidents at danger points like bridge abutments.
   9. Rigid sign supports which injure motorists when hit can be replaced by breakaway posts that will safely give way on impact.
   10. Over-sized warning signs sometimes reduce the hazard at high accident locations.
   11. Level of safety could be improved if dangerous portions of rural highways were properly lighted (curves, intersections, bridges, overpasses, underpasses, tunnels, interchanges, elevated and depressed areas, etc.).
   12. Motorists are helped by the use of advisory speed signs located just below curve signs, when they are based on actual study of conditions.
   13. Eliminating or reducing excessive curvature; increasing visibility at hillcrests; and providing frequent sections where motorists have enough clear sight distance to pass with safety are costly but necessary improvements if rural two-lane roads are to be improved.

C. The freeway-type design required on the interstate system demonstrates that many types of accidents can be reduced or eliminated through fully controlled access; wide median strips; grade separations, acceleration and deceleration lanes; adequate sight distances, wide shoulders, roadside clear of obstructions; flat drainage slopes; no traffic lights, parked cars or pedestrians; and slow-moving traffic prohibited.

1. In addition, the freeway design takes cognizance of the fact that a driver can assimilate only a limited amount of information and needs sufficient time to perceive and act on it. (A maximum of three destination points on one sign and the sign is usually placed one-quarter of a mile to two miles ahead of where the driver needs to take action.)
2. The traffic engineer has not devised a way to protect the driver completely from rear-end and run-off-roadway collisions, short of making the driver fully obsolete as far as vehicle control is concerned. (Unfortunately, it will be a long time before there are even a limited number of miles of "automated" highways upon which electronic guidance equipment in the vehicle and the roadway take over.)

2.7 In locating new highways both individual rights and the rights of the public must be protected.

A. Before the location for a new highway is finally decided upon, public hearings are held to give people the opportunity to hear the facts and to voice objections if there are any.

B. Those people who must move suffer inconvenience and sometimes hardship, but highways have to be located to serve the needs of all the people. (Every effort should be made to reduce the inconvenience and eliminate the hardship.)

C. New and improved highways increase business overall.

2.8 A traffic engineering department needs to be adequately staffed, assigned primary responsibility for traffic control, and backed up with sufficient authority to make decisions hold.

A. Traffic engineers experience pressures from individuals and groups motivated by selfish interests.

B. Traffic engineers are targets for criticism and advice of well meaning but badly informed "traffic experts."

C. Knowledgeable citizens can aid the traffic engineer by helping to stop rumors and misdirected actions by uninformed people who believe they have a solution to some phase of traffic engineering.

Pre/Post Assessment

Traffic Engineering

1. Many of our rural roads need to be modernized to handle today's traffic.
   _____True _____False

2. Engineering mistakes on a highway could cost some drivers their lives.
   _____True _____False

3. The best engineering remedy is the one that corrects the problem with the least interference at the least cost.
   _____True _____False

4. The traffic engineer should be concerned with the entire roadway system, not just the one road where there is a problem.
   _____True _____False

5. Qualification to be a highway engineer consists of a good knowledge of driving and good driving skills.
   _____True _____False

6. Which of the following would provide the best evaluation of an engineering change?
   _____A. Before and after accident records.
   _____B. Driver complaints.
   _____C. An award to the engineer for the design.
   _____D. Another engineer's evaluation of the change.

7. A major aim of a traffic engineer is to
   _____A. eliminate or reduce turbulence in traffic flow.
   _____B. make straight roads.
   _____C. make roads with scenic attractions.
   _____D. make as many roads as possible.

8. Which of the following should an engineer be concerned with when planning a roadway or highway?
   _____A. Land use, present and future.
   _____B. Traffic patterns, present and future.
   _____C. Future vehicle design and capability.
   _____D. All of the above.

9. The best solution for the development of a safe traffic environment is
    _____A. better law enforcement.
    _____B. more research by automobile engineers.
    _____C. more traffic courts.
    _____D. development of a universal driver education program.
    _____E. All of these.

10. One way we can improve traffic safety is to
    _____A. stay off the highways.
    _____B. put extra lights on all vehicles.
    _____C. get involved in traffic safety programs.
    _____D. post better signs on highways.

11. Which of the following items are connected with inadequate highway design?
    _____A. Unprotected bridge ends.
    _____B. Traffic Islands.
    _____C. Non-breakaway freeway signs.
    _____D. Soft shoulders.
    _____E. Confusing highway signs.
    _____F. Inadequate sight distance.

Pre/Post Assessment Answers

Traffic Engineering

1. True
2. True
3. True
4. True
5. False
6. A
7. A
8. D
9. E
10. C
11. A, C, D, F

Appropriate Instructional Materials

Traffic Engineering

"Anatomy of a Road," General Motors Building, Detroit, MI 48202.

Filmstrip:
"Highway Engineering," Bumpa-Tel, P.O.Box 611, Cape Girardeau, MO 63701.

Textbook References

Drive Right.
pp. 350 (1977)

Driver Education and Traffic Safety.
pp. 192-206, 316-317

Driving: A Task Analysis Approach.
pp. 9, 14, 30, 87-96, 116, 123, 144, 233, 247

Driving with Car Control.
pp. 141-144, 155-162, 231-236

In the Driver's Seat.
pp. 5, 41-44, 129-134, 198-200, 203-204, 212-215

Safe Performance Driving.
pp. 53-66, 308

Tomorrow's Drivers.
pp. 3-4, 230-231

Unit B: System Improvement

3.0 Driver Licensing

Principle: The major responsibility of traffic education is to teach students the basic skills and knowledge necessary to become safe and efficient drivers. The driver licensing procedure is the process whereby a student's knowledge and ability are evaluated. The responsibilities of driving are many and only those qualified should be given a license. Students should be aware that the driving privilege can be withdrawn under certain circumstances.

3.1 Driving Privilege

Objectives/ Student Behavior: Students will describe the characteristics of a responsible driver.

Learning Activities: Discussion questions:

Why is the license a privilege and not a right?
What is responsible driving?

3.2 Qualifications

Objectives/ Student Behavior: Students will identify the correct procedures in applying for a driver's license. Students will describe the skills and abilities necessary to quality for a license. Students will know the hours the driver exam station is open and the best times to go for the tests.

Learning Activities: Discuss the qualifications needed in each of the following to be an effective and responsible driver: driving skills, physical requirements, and mental capabilities. Have group discussion pertaining to correct procedure in applying for a driver's license.

3.3 Types of Licenses

Objectives/ Student Behavior: Students will differentiate between the various driver's licenses required to operate different vehicles and the obligations and responsibilities of each. Students will explain the correct procedure for renewing a driver's license.

Learning Activities: Through class discussion the various types of driver's licenses will be reviewed. Discussion questions:

What is an operator's license? How can it be used?
What is an instruction permit?
What is a chauffeur's license? How can it be used?
What is a motorcycle endorsement?
What is a traffic education learner's license?
Should there be a separate license for go-carts, scooters, motorized bicycles and snowmobiles?
What is a provisional license?
What is a restricted license?
What is needed to renew a driver's license?

3.4 License Revocation

Objectives/ Student Behavior:	Students will identify and analyze the ways in which a driver's license may be suspended or revoked.
Learning Activities:	Discuss the reasons a driver's license is suspended or revoked as stated in the Montana Driver's Manual and Motor Vehicle Code Book.

Content

3.0 Driving is a privilege not a right. The privilege is earned and can be taken away.

3.1 Only responsible people who possess competencies necessary for driving should be allowed to drive.

A. Accepting the responsibility of driving safely and obeying traffic laws is part of the driving privilege.

3.2 The qualifications for driving include mental and physical standards.

A. Physical qualifications will eliminate those not qualified to drive. Some physical qualifications might include:
1. hearing ability—an important aspect of driving, but one that can be compensated for;
2. vision—a certain standard of vision must be met before you are given a license;
3. physical handicaps—while there are many types of handicaps that would prevent a person from driving, many handicapped people can drive when proper modifications have been made to the vehicle. It is recommended the student practice driving skills under qualified supervision before trying to obtain a driver's license.

B. Mental qualifications can be determined by knowledge and application of driving rules, signs, skills and procedures.

3.3 There are different license classifications for various types of driving.

A. Traffic Education Permit and Learner License—Allows a student to drive under the direction of a qualified traffic education instructor and/or licensed parent or legal guardian.

B. Instruction Permit—Allows a student to drive under the supervision of another licensed driver.

C. Driver License—Allows an individual to drive without others in the vehicle.

D. Motorcycle Endorsement—Allows an individual to operate a motorcycle. In order to do so, a separate motorcycle driving test must be passed.

E. Chauffeur's License—Necessary before a driver can transport property or people for hire. This license can only be obtained after the person holds a valid driver license and passes additional tests.

F. Restricted License—At times a license will be granted with some restrictions (no driving after dark, must wear glasses when driving, etc.).

G. Driver License Testing—Some driver license offices operate at reduced hours. Applicants should contact the examiner when the exam station first opens in the morning so that they may have sufficient time to complete the examinations.

3.4 When a driver demonstrates irresponsible driving, the driving privilege is revoked or suspended based upon a point system.

A. As a driver is convicted of traffic offenses, a certain number of points are earned according to the severity of the offense. Anyone accumulating 30 points over a 3-year period of time will lose their license as specified in Montana law. Because Montana motor vehicle law is constantly being changed, it is recommended that the instructor refer to the current issues of the Montana Motor Vehicle Code book and the Montana Driver's Manual for up-to-date information regarding licensing and traffic law.

Pre/Post Assessment

Driver Licensing

1. Driving is a right not a privilege.
   _____True _____False

2. Some driving offenses could result in loss of your driver's license.
   _____True _____False

3. A driver's license automatically allows you to drive any motorized vehicle except a bus.
   _____True _____False

4. People who cannot hear are unable to obtain a driver's license.
   _____True _____False

5. All that is needed to renew a non-expired driver's license is an eye test and fee payment.
   _____True _____False

6. Which of the following is not included in a Montana driver's license examination?
   _____A. Knowledge of traffic laws
   _____B. Driving skill
   _____C. Reaction time
   _____D. Vision

7. If a driver's visual accuity is 20/40 or above, what type of driver's license will be issued?
   _____A. Restricted
   _____B. Conditional
   _____C. Suspended
   _____D. Probational

8. What is the minimum age you can get a driver's license?
   _____A. 14 years
   _____B. 15 years
   _____C. 16 years
   _____D. 17 years

9. Who issues driver's licenses in Montana?
   _____A. Sheriff
   _____B. City Police
   _____C. Highway Patrol
   _____D. Driver Services Bureau

10. Which of the following vehicles requires a chauffeur's license?
    _____A. School bus
    _____B. Automobile
    _____C. Motorcycle
    _____D. Pickup truck

11. What kind of license are professional truck drivers required to have?
    _____A. Driver's license
    _____B. Learner's license
    _____C. Chauffeur's license
    _____D. Restricted license

Pre/Post Assessment Answers

Driver Licensing

1. True
2. True
3. False
4. False
5. True
6. C
7. A
8. B
9. D
10. A
11. C

Textbook References

Driver Licensing

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